The Rubber Age

Published Monthly at East Stroudsburg, Pa.
Editorial and Advertising Offices: 250 W. 57th St., New York

Vol. 41 AUGUST, 1937 No. 5

Further Details on RAYON IN TIRES

Including Abstracts from R. P. Dinsmore's American Patent on a "Pneumatic Tire and Fabric Therefore"

COMPARATIVELY little information has been made available on the use of rayon cord in tire construction since the announcement made by the Goodyear Tire and Rubber Company and U. S. Rubber Products, Inc., to the effect that they were introducing truck tires incorporating the use of rayon. One or two additional tire manufacturers, including Master, have also announced such tires in the past few months. What information was made available has been summed up in recent issues of THE RUBBER AGE (see page 181, June, 1937, and page 372, March, 1937). The following data, based on specific information secured from the engineering division of Goodyear, supplements previously published material.

Internal tire heat has always been a problem for tire engineers. In the past decade this problem has become more and more acute, since truck and bus manufacturers have consistently improved their products so as to carry heavier pay loads at greatly sustained speeds. In many operations where these conditions prevail, it is not abnormal for tires to build up an internal temperature of 250° F. or more. High temperatures, as is known, quickly deteriorate cotton cords with the result that tensile is reduced to a point where early blowouts are anticipated. Tire engineers appreciated the fact that rayon cords in the carcass would carry a tire through these high temperature operations because of their remarkable ability to withstand great heat at much less loss in tensile than the cotton cords.

Based on this conviction Goodyear's research division started to experiment on the use of rayon in tires more than 10 years ago (see THE RUBBER AGE, June 10, 1926). Several commercial varieties, popular on the market at that time, were tried and found to be unsatisfactory for tire cord principally because they were characterized by a relatively low tensile strength when wet and because of low elastic limit and consequent inability to "come back" after elongation within certain limits.

Faced with this situation, Goodyear, in conjunction with the fabric division of E. I. du Pont de Nemours and Company, set about to overcome the inherent disadvantages of the types of rayon currently available so that they might secure a rayon fabric that would continue to retain a great portion of its cold tensile at high temperatures (a very desirable feature in tire operation) but which would be free of low elastic limit and low tensile strength when wet.

The combined efforts of the two companies were directed to three achievements: (1) to produce new and beneficial properties in a rayon fabric suitable for

tire construction, (2) to provide a pneumatic tire which possessed characteristics superior to those of various prior art structures, one which could be produced with practical economy, and (3) to provide such a tire that could be manufactured with current machinery and equipment.

After a long series of experiments a suitable rayon fabric was evolved. Along with this development Goodyear also had to perfect a twist method for making the rayon into cords, a problem comparable in importance to the development of the special rayon itself. Still another problem which immediately arose was the lack of adhesion between the new rayon and rubber compounds. This latter problem was overcome by the development of a solution with which the rayon cord is treated in order to create the necessary bond.

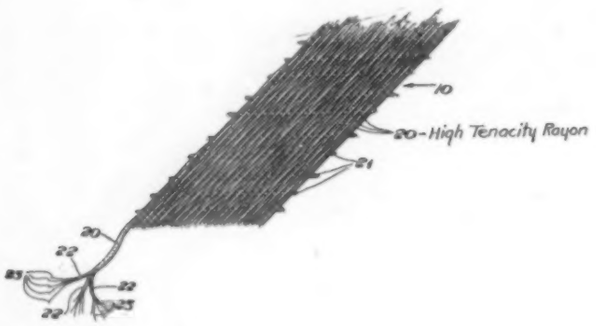


FIG. 1—Fragmentary Piece of Improved Rayon Fabric.

Legend: 10—fabric plies composed of several parallel cords; 20—high tenacity rayon; 21—light filler threads; 22—cord composed of three twisted strands; 23—twisted strands composed of five yarns each.

The manufacture of the rayon cord should prove of interest. Goodyear buys rayon from the vendor in the form of single yarn known as 275 denier, which corresponds in weight to about a 19's cotton yarn. The rayon yarn is purchased to a definite specification as to twist, tensile, per cent elongation, etc. The 275 denier is made into a 4-ply strand and three of these strands are cabled, so the resultant cord is 275/4/3. This cord is approximately 12% lighter than the standard 23/5/3 cotton cord used in the tire manufacturing industry. Although Goodyear has adopted this cord construction, other specific constructions may, of course, be used.

Preparation of the rayon cord and its advantage over ordinary cotton cord in tire manufacture is best explained in the following abstracts from U. S. Patent 2,058,778, by Ray P. Dinsmore, assistant factory manager of Goodyear, which has been assigned to the Wingfoot Corporation, a Goodyear subsidiary:

Each of the fabric plies (as applied to standard tire construction) is composed of a plurality of closely arranged parallel cords of high-tenacity rayon, which may be either cross-woven or pickless, if desired, or woven with light filler threads. The fabric from which the plies are formed is preferably provided with a thin coating of rubber, as by calendering or impregnating, in order to effect the proper adhesion of the several plies in the carcass. The individual cords function in the plies as load-bearing elements extending from one bead to the other and on a bias with reference to the central circumferential plane of the tire.

The cords are characterized by substantial tensile strength which is not critically reduced by either moisture or heat to which tney are subjected in a tire. There may be some reduction in tensile strength due to the heat and therefore cords should not be used whose tensile strength at a temperature of 250°F. will not be substantially less than 66% of such strength as measured at ordinary room temperature. Similarly, the cords when saturated with moisture should have a tensile strength not substantially less than 66% of that as measured in normal room humidity.

Filaments which compose the cords may be produced by any one of the several processes known to the synthetic fiber industry, as, for example, by the cellulose nitrate, cuprammonium, viscose or cellulose acetate processes, but more particularly by novel modifications of the viscose process. Briefly, this new process comprises shredding purified linters or wood pulp which have been saturated with a strong caustic soda solution, aging the shredded soda-cellulose crumbs, reacting with carbon disulphide to form sodium cellulose xanthate, dissolving this in alkaline solution, forcing the resultant viscose solution through a filter and spinneret in an acid precipitating bath, and finally collecting and spinning the filaments regenerated in the acid bath.

The yarns produced by this process, or by any other preferred process, are then twisted into cords, with the number of yarns used, the number of twists per inch, and the directions of the twists of the several components varying for different cords in accordance with established principles of cord design. The number of turns per inch of the filaments in each yarn is known as the singles twist, the number of turns per inch of five yarns which compose a strand is known as the intermediate twist, and the number of turns per inch of the three strands which compose the cord is known as the cable twist. The relative directions of the twists may be RRL, LLR, RLR, or LRL. Data relating to tests made between a standard cotton cord and three samples of the new rayon cord are shown in the following table:

	Cotton	Rayon	Rayon	Rayon
Sample number	187	29	31	39
Denier	—	275	275	275
Filaments	—	120	120	120
Construction	23/5/3	–/5/3	–/5/3	–/5/3
Twist direction	RRL	LRL	LRL	RLR
Cable twists (turns per inch)	9.6	10.2	9.8	9.90
Intermediate twist	20.2	18.5	19.9	20.4
Single twist	21.2	4.1	5.7	7.0
Wt. grams/meter	.49	.57	.57	.56
Tensile-normal (lbs. pull)	17.7	21.4	21.6	16.7
Tensile hot (250°F.—lbs. pull)	11.5	17.7	18.1	15.6
Normal tensile/gram meter	36.0	37.5	37.7	29.6
Hot tensile/gram meter	23.4	31.0	31.6	27.9
Ultimate elongation %	16.0	17.0	16.6	14.4

The cotton cord used in the tests indicated by the table above is one which is extensively used in tires and which has been considered highly successful as cotton cords go. It will be noted that the singles twist in the rayon cords is very much lower than in the cotton cord. The higher singles twist is necessary in the cotton cord in order to interlock the fibers properly to give tensile strength, whereas in the rayon cord the elementary filaments do not require such high twisting for interlocking. In fact it has been found that the tensile strength of rayon yarns decreases as the singles twist goes up. Apart from this, the low singles twist of the rayon gives an unexpected advantage because it promotes adhesion to rubber. In some rayon samples it was found that the strongest yarn was obtained with

a twist of about 8.5 turns per inch, but that strongest cord from the same size yarn was obtained with a singles twist or yarn twist of about 5 turns per inch.

As stated, one of the principal characteristics of this high-tenacity rayon is its hot tensile strength, which is considerably higher than cotton. Reference to the table shows that the tensile strength of cotton cord when heated to 250°F. was only 11.5 pounds, whereas under the same conditions the three specimens of rayon were 17.7, 18.1 and 15.6, respectively. A visual comparison of the elongation properties of the cotton cord and two samples of the rayon used in the tests indicated by the table, as well as of a prior art rayon, may be secured from Figure 2.

From this chart it will be seen that the stress-strain curve of the high-tenacity rayon is substantially straight, or even tending toward concavity to the axis of strain, with a substantially uniform degree of elongation throughout the expected range of tension, whereas the curve of the prior art rayon bends critically upwards and shows that the cord has entirely too much elongation to be suitable for use in tires.

Another striking feature of the improved rayon cords is that they have much greater durability than do cotton cords. Of many samples which have been comparatively tested by Goodyear one piece of the improved rayon cord showed a durability fifteen times greater than the most durable cotton cord, although by averaging all the tests it appears that rayon cords have a durability in excess of five times that of cotton cords. In all, 18 claims are contained in the patent.

Extra Cost of Rayon Tires

There are several reasons why rayon tires cost more than conventional cotton cord tires in addition to the higher rayon yarn cost itself. One big item of extra cost is found in the greater moisture loss in rayon. The standard basis of buying rayon is on an 11% moisture regain, but the actual moisture content will approximate 13%. Cotton, on the average, runs to about 6%. In processing the two fabrics, cotton and rayon, for tire construction, nearly all the moisture is driven off in the case of rayon, whereas cotton holds about 2% of moisture. On this basis, the shrinkage in rayon is approximately three times that of cotton.

Another big item of cost is the extra process involved of applying the adhesive solution to the rayon, a process which is unnecessary on cotton fabric. Both labor and materials in this process are relatively expensive.

Prior to the public announcement of rayon cord tires, Goodyear placed in service more than 10,000 tires, approximately 3,000 of these being tested on various high speed bus accounts and the balance sold through regular commercial channels throughout the country. In addition, the company ran innumerable tests on its testing grounds in Arizona, where tires were subjected to both normal and extremely high temperatures. The results of two of these tests follow:

Average Maximum Air Temperature	*Conventional Tire Mileage*	*Rayon Tire Mileage*
80°F.	6,000	20,000
106°F.	600	18,000

The conditions were the same throughout these tests, except the matter of temperature which varied with the season of the year.

Tire engineers have been experimenting for years to construct tires using materials other than cotton cords for the structural elements, but until the development of special rayon cords such attempts met with no practical success. Natural silk, for instance, while found structurally suitable, at least for limited use in such tires, has been much too costly for general use, although it is used in constructing bicycle racing tires. Metallic wire, too, has been tried in several forms, but has been found to be too heavy, too difficult to insulate with the essential rubber, and not sufficiently flexible or elastic to provide the desired degree of riding comfort.

The improved rayon cord described in Dinsmore's patent also lends itself to uses other than for substitution of cotton cord in tire construction. It may be adapted for use in breaker strips and other parts of the tire, as well as in belting, hose and other articles of manufacture where its special properties can be advantageously used.

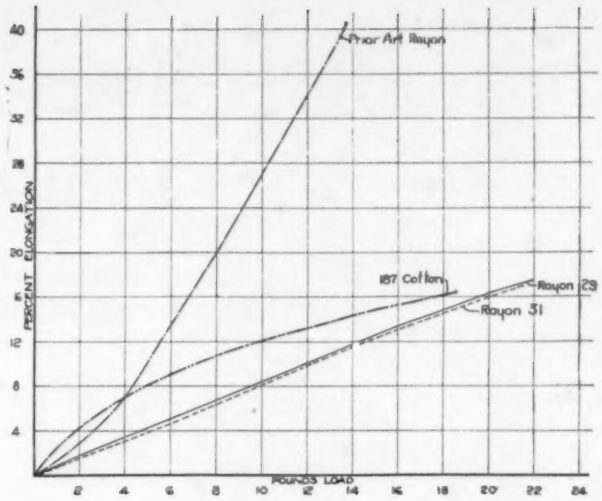


FIG. 2—Stress-Strain Curves of Rayon and Cotton Cords.

Note: The numbers indicate test specimens of cotton and rayon cord used by Goodyear. Further comparisons on these cords are shown in the table on the opposite page.

Bostik Neoprene Cements

SEVERAL new cements, which incorporate neoprene in their compositions, have been added to the line of cements sold by the B. B. Chemical Company of Cambridge, Massachusetts (the chemical division of the United Shoe Machinery Corporation), under the name of Bostik. These new cements, in combinations with others made by the company in some cases, are adaptable to a variety of uses, including the adhesion of neoprene to rubber, neoprene to itself, neoprene to Thiokol, Thiokol to itself, crude rubber to Thiokol, neoprene or Thiokol to fabric. In all of these applications, the materials are handled in the uncured state, with curing effected after application of the cement.

In addition to these applications, the new cements may also be used for the adhesion of seams of Thiokol and neoprene coated fabrics, adhesion of cured Thiokol and neoprene to metals and other materials, for the formation of adhesive integral oil and gasoline tight gaskets in riveted aluminum and steel joints for airplanes and other uses, for adhesion of uncured neoprene to vulcanized rubber, with subsequent cure (in wire and cable manufacture), for adhesion or rubber to metal, and for the adhesion of uncured neoprene and Thiokol to metal and wood, with subsequent cure.

Rubber Division, A.C.S., to Meet at Rochester

Eleven Papers Are Scheduled for Two-Day Session to Be Held at the Powers Hotel on September 9 and 10

ELEVEN papers will be presented at the Fall meeting of the Rubber Division, A.C.S., to be held on Thursday and Friday, September 9 and 10, in the Powers Hotel, Rochester, New York, in conjunction with the 94th Meeting of the Society. Registrations, reservations for banquets, trips, etc., will have to be made at the headquarters of the Society which will be maintained at the Hotel Seneca, a few blocks from the Powers Hotel. Both sessions of the Rubber Division will be held in the Powers Hotel. As usual, a number of sight-seeing trips will be held, including visits to the Eastman Kodak Laboratories, Corning Glass Works and Taylor Wine Company. A golf tournament is also scheduled for Thursday afternoon, September 9, at the Oak Hill Country Club.

The customary banquet will again be held, although the Banquet Committee, headed by V. L. Smithers, of V. L. Smithers, Inc., 2706 First Central Tower, Akron, Ohio, has announced several deviations from the ordinary. In the first place, according to Mr. Smithers, there will be neither prizes nor table favors this year. In lieu of these features, the Committee is planning to present a series of better class vaudeville acts, secured through the backing of the suppliers who generally supply the favors and prizes.

It is the plan of the Banquet Committee to give each act the appearance of being sponsored by some supplier, *i.e.*, introducing the acts as the "Naugatucketeers," the "DuPont Dancing Dandies," etc. Suppliers who wish to contribute to the entertainment should communicate with Mr. Smithers. The banquet will be held in the Powers Hotel on September 9.

One of the eleven papers to be presented will be delivered by a guest speaker from London, England, Mr. John N. Dean of the Telegraph Construction and Maintenance Company, Ltd. He will discuss the electrical characteristics of gutta-percha and balata, as well as their aging properties.

The program of the meeting and abstracts of the papers follow herewith:

RUBBER DIVISION, A.C.S.

PROGRAM OF MEETING

H. L. TRUMBULL, Chairman

September 9-10, 1937

Powers Hotel, Rochester, N. Y.

Thursday Afternoon—September 9

1:30-1:45

Preparation and Testing of Latex Compounds. ***By J. W. MacKay (Monsanto Chemical).***

A simplified method for obtaining uniform and reproducible physical test data on latex compounds is described. The control of temperature and humidity from the pouring of the films to the ultimate testing of the test strip is necessary to produce these results.

1:55-2:10

The Protein from Natural Rubber and Its Amino Acid Constituents. ***By Thomas Midgely, Jr., Albert L. Henne and Mary W. Renoll (Midgely Foundation).***

The protein constituent of rubber has been extracted from the natural rubber by removal of the rubber hydrocarbon with solvents, followed by electrodialysis of the residue. A material has thus been obtained which contains 57.66% C., 7.54% H., 12.52% N., and 22.28% O., corresponding to a formula $(C_{36}H_{58}N_2O_8)_x$. This material is hydrolyzed by sulfuric acid, and the hydrolysate contains glycine, aspartic acid, leucine, proline, arginine, histidine, lysine and representatives of the group comprising alanine, phenyl alanine, hydroxyproline and serine. Cystine, tyrosine and glutamic acid are absent.

2:20-2:50

Ultra-Violet Microscopy of Hevea Rubber Latex. ***By Francis F. Lucas (Bell Telephone Laboratories).***

Samples of bulk rubber latex received in sealed cans from two sources have been investigated by means of the ultra-violet microscope. The advantages of the ultra-violet microscope are: (1) an enormous increase in resolving power; (2) selective absorption of the ultra-violet light by many substances; and (3) the ability to optically section very small objects suited to the purpose. Brief descriptions of the apparatus and technique are given. Artifacts have been minimized in the preparation of the slides. A multitude of particles bordering on colloidal dimensions have been clearly resolved. Particle size measurements including complete tabular data and a particle size distribution curve for each specimen are given.

Approximately 90% of the particles are 0.50 micron or less in diameter. The shape of the latex particle appears predominantly spherical, though elongated particles and irregular shaped particles are found. Optical sections in some cases show these to be groups of particles, in others single particles. Some evidence is disclosed that two particles may coalesce to form one. Many of the smaller particles appear to lose their electrical charges and become attached to larger particles. Possible effects of ultra-violet radiation are discussed.

3:00-3:15

Composition and Structure of Hevea Latex. ***By A. R. Kemp (Bell Telephone Laboratories).***

Data relating to composition and structure of the latex particles are presented. The number of particles in one gram of 40 per cent latex has been calculated and found to be 47 x

(Reprints of all abstracts will be available at the meeting)

10^{12} on the basis that they are round and have an average diameter of 0.26 micron as determined by F. F. Lucas.

A study was made of the effect of several factors on the water content of rubber in pressed coagulum from fresh and treated lattices. The average value for the water of retention of rubber coagula from fresh latex was found to be about 11 per cent increasing to about 22 per cent in the case of old latex and deproteinized rubber from alkali-treated latex. It appears that this water is held mechanically in the colloid hydrocarbon structure of the latex particles.

The particle structure of sheet rubber is discussed and it is suggested that plasticization by milling results in the gel hydrocarbon shell on the rubber particles being converted to sol rubber through the agency of heat in the presence of oxygen. The difference between gel and sol rubber is believed to be mainly one of colloidal state since swollen gel in CS_2 is readily dispersed on the addition of propionic acid.

3:25-3:40

Softening Agents in Neoprene. ***By Howard W. Starkweather and Herbert W. Walker (DuPont).***

The influence of typical representatives of the common chemical classes of rubber softening agents on the properties of carbon black-loaded neoprene has been determined. The properties studied include plasticity, stability and retention of softness of uncured neoprene, and stress-strain properties, hardness and resistance toward solvents of cured neoprene. Certain softening agents have been found to be superior for special uses.

3:50-4:05

Water Resistance of Neoprene. ***By Howard W. Starkweather and Herbert W. Walker (DuPont).***

The contraction in total volume during absorption of water by neoprene compounds containing magnesia is attributed to hydration of the magnesia. Neoprene compounds with a water resistance exceeding that of smoked sheet rubber compounds may be obtained by compounding with litharge and such additional activators as zinc sulfide and catechol. Rosin improves the water resistance of neoprene compounds at elevated temperatures. Sulfur decreases the water resistance of magnesia-zinc oxide and litharge-neoprene compounds in proportion to the amount used. The influence of temperature on the water absorption of both magnesia-zinc oxide and litharge compounds has been determined.

Thursday Evening—September 9

Rubber Division Banquet — Powers Hotel

Friday Morning—September 10

9:00-9:15

A Comparison of the Vulcanizing Characteristics of Smoked Sheets and Latex Rubbers. ***By E. W. Booth and J. W. MacKay (Monsanto Chemical).***

Latex rubbers markedly affect some accelerators and others little or not at all. Latex rubbers give higher modulus, faster rate of cure and more scorch than smoked sheets. The addition of NaOH to smoked sheets duplicates the results of latex when mercaptobenzothiazole is employed as the accelerator. Mercaptobenzothiazole, di(benzothiazyl thiol) dimethyl urea, butyraldehyde and butylidene aniline reaction product and diphenyl guanidine are not sufficiently active for commercial use with either latex or smoked sheets rubber at temperatures and times of cure desired by manufacturers of latex products.

Ultra-accelerators at 109°C. (227°F.) give similar results with smoked sheets and latex rubbers. Increasing the amounts of zinc oxide has little or no effect on the curing results. Increasing the amounts of sulfur markedly increased the modulus and tensile results.

9:25-9:45

Electrical Characteristics and Aging Properties of Gutta-Percha and Balata. ***By John N. Dean (Telegraph Construction and Maintenance Co., Ltd., London, England).***

Data is given upon the dielectric resistance, electrification, dielectric constant and loss factor of several groups of natural compositions of the gutta-percha class. Curves connecting the variation of some of these properties with time and temperature, and the effect of additions of one component to another, are also included. It is demonstrated that the electrical characteristics of a mixture cannot be predicted from a knowledge of the figures relative to the components. The aging properties and methods by which accurate data may be obtained are stated. The general results are discussed in the light of cable requirements and a plea made for the alteration of cable specifications in the light of the data available.

9:55-10:25

Sorption of Water by Rubber. ***By R. L. Taylor and A. R. Kemp (Bell Telephone Laboratories).***

The effect of several variables on the rate of sorption of water by rubber is discussed. Expressions based on short-time immersion tests are derived which permit calculation of the water content after any period of immersion under fixed conditions of temperature and vapor pressure. A sorption coefficient by which one material may be compared with another is suggested and its application to practical problems is considered.

10:35-11:00

The Goodrich Flexometer. ***By E. T. Lessig (Goodrich).***

A new form of hysteresis test has been developed in the Goodrich laboratory and used for a number of years in the study of heat generation and fatigue of both rubber and rubber-fabric compositions at ordinary and elevated temperatures. It involves applying a definite compressive load to a test piece through a lever system having high inertia, imposing on the sample an additional high-frequency cyclic compression of definite amplitude and measuring with a thermocouple the temperature rise at the base of the test piece. Because of the high inertia and low natural period of the lever system, practically none of the high-frequency vibration is transmitted to the loading lever, although the lever does move to compensate for slow changes in the sample caused by permanent set and other structural changes.

The machine may be used to study the effects of the time of cure, the magnitude of the applied load, changes in pigmentation and variations caused by anisotropy in rubber compounds on the heat generation during flexure. It is so designed that structural changes such as softening or stiffening may be followed during the period of flexure.

11:15-11:35

The T-50 Test Applied to Zinc Oxide Compounds. ***By George S. Haslam and Clarence A. Klaman (N. J. Zinc).***

The authors have adapted the T-50 test, as described by Gibbons, Gerke and Tingey in 1933, to a study of the curing rate of zinc oxides in rubber compounds. A new method of expressing results obtained in this test is used which condenses the data and renders comparisons relatively easy. The major variables in zinc oxide, particle size, and chemical purity have been studied with several accelerators and conclusions drawn as to the effectiveness of these variations in zinc oxide on curing rate in both gum stocks and loaded stocks. Data on the reproducibility of the test and the effect of the freezing temperature and of shelf aging are also given.

11:45

Business Meeting

12:00

Executive Committee Meeting

To Owners of Noble's "Latex in Industry"

The author has prepared an addenda and errata list which represents not only errors in patent numbers and typography but which includes a number of references originally omitted from the book. This list, in printed form which may be readily pasted into the original copy, is available without cost to all purchasers of the book. Address requests to THE RUBBER AGE, 250 West 57th Street, New York City.

Consistency Measurement of Rubber and Rubber Compounds

A Discussion of the Nature of the Rheological Problem of Rubber Together with a Description of Instruments Employed in Testing Rubber's Rheological Properties

By J. H. Dillon and L. V. Cooper,
of the Firestone Tire and Rubber Company, Akron

ONE of the fifteen major industries of the United States is the rubber industry. Its annual expenditures for research amount to over three million dollars—a large portion of which is directed toward definitely establishing the chemical and physical nature of this material called rubber *(1)*. The structural unit of rubber, that is the empirical formula, is reasonably well established, but the size and the shape of the molecule are still highly debatable questions. As to molecular weight, data have been advanced showing a value of 1,000 as determined by one method. Higher values have been obtained by other methods and the maximum so far advanced is 378,000. The molecular structure observations and theories also vary greatly.

Theories of Rubber Structure

Insofar as structure is a prime factor in flow, it seems desirable to outline the principal theories of rubber structure. At present, two distinctly different types of theories are being advanced. One of them is the chain theory of which several modifications have been proposed:

(a) Long chains of different lengths bound together in a micelle.
(b) Long interlaced coiled chains.
(c) Long chains twisted like a tangle of twine.

According to the other theory, rubber is a two-phase material with the sol and gel phases having varying relationships. This theory also has modifications.

The fact that many different commercial rubbers exist greatly complicates the rheological problem for rubber. For example, there is every indication that the rubber from an older tree differs from the rubber which the same tree produced when young.

In view of all these opposing theories and the possibility that rubber, even in its purest form, may be a combination of several structural types, the application of absolute units to the rheological problem for rubber is clearly not a simple task. This paper will be confined to the discussion of consistency measurements of crude rubber and unvulcanized commercial rubber compounds only. The closely allied and important field of research on rubber solutions and dispersions will be omitted from this discussion.

This paper was presented at the Symposium of Consistency, held on June 29, 1937, in New York City, in conjunction with the 40th Annual Meeting of the American Society for Testing Materials.

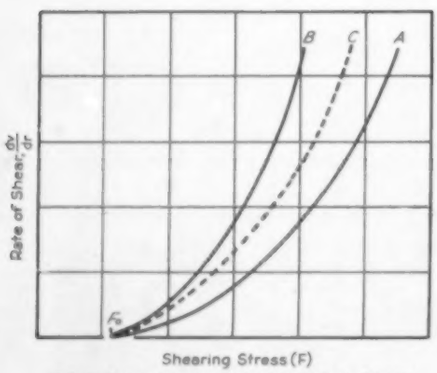


FIG. 1—RHEOLOGICAL CURVES FOR RUBBER.

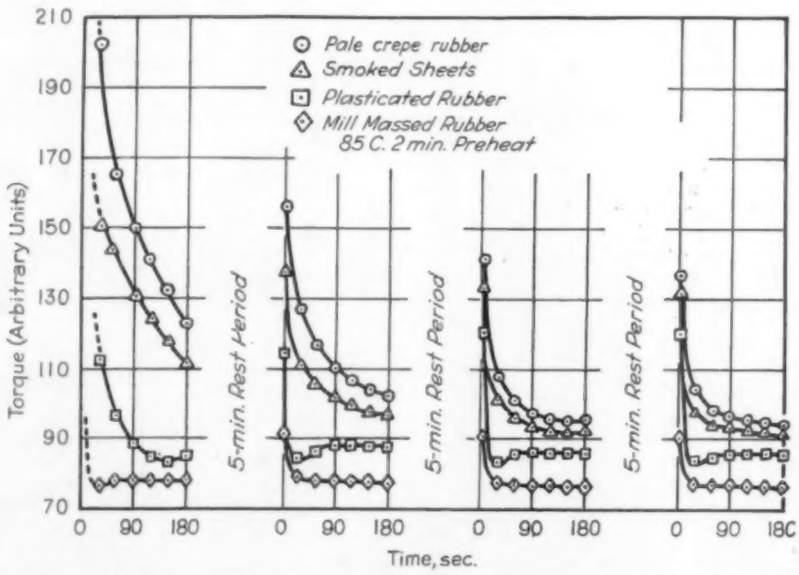


FIG. 2—SHEARING DISK PLASTOMETER, TORQUE VS. TIME.

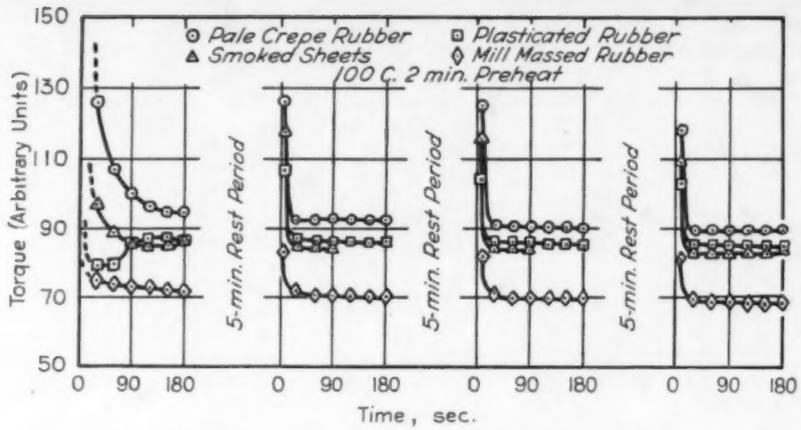


FIG. 3.—SHEARING DISK PLASTOMETER, TORQUE vs. TIME

Rheological Problem for Rubber

A complete experimental study of the rheological problem for rubber has never been performed. Experiments which have been made indicate quite definitely that the rheological curve (rate of shear vs. shearing stress) is concave upwards, that is, the consistency (shearing stress/rate of shear) decreases with increasing shearing stress. Crude rubbers and compounded rubbers, in most cases, retain an appreciable elastic component even after the prolonged breakdown on a mill. Thus these materials, as a group, appear to approximate the elastico-viscous type of solid as defined by the Committee on Definitions and Nomenclature of the Society of Rheology *(2)*. Rubbers, particularly uncompounded rubbers, exhibit the property of thixotropy very strongly in that the consistency is decreased by mechanical working but increases after cessation of the agitation. The fact that a permanent decrease in consistency occurs during the agitation (mechanical breakdown) tends to obscure the reversible thixotropic changes and makes their study difficult.

The curves of Figure 1 are typical of those obtained for unvulcanized rubber under shearing stress. Curve "A" is obtained if the rubber is not pre-worked. If the rubber is pre-worked before making each of the measurements, curve "B" results. If the rubber is then allowed to stand for a few minutes and the measurements made without pre-working, curve "C" results. The differences between the ordinates of curves "A" and "C" are explained on the basis that a permanent decrease in consistency occurred during the pre-working as well as the reversible thixotropic softening.

In practice it is impossible to obtain curve "A" accurately since the action of the consistency measuring device introduces considerable mechanical agitation. In general, increasing the amount of pigment such as carbon black in the rubber compound appears to cause the curves to approach linearity with a reasonably definite intercept F_0 on the stress axis (yield stress) *(3)*. Raising the temperature of the rubber decreases the consistency and, in general, causes the curves to become more nearly linear and the yield stress to decrease. Great care must be taken to avoid or at least recognize pre-vulcanization which sets in to an appreciable degree at temperatures as low as 70° C. for some commercial rubber compounds.

Methods of Test

The foregoing shows that the rheological problem for rubber is very complicated and indicates the difficulties to be expected in making consistency measurements. There are two principal methods of attack on the problem of consistency measurement of rubber. The first of the methods consists in the attempt to measure a fundamental rheological property, such as consistency, in terms of absolute units. This method requires a careful analysis of the fundamental relationships which, at the present time, are far from completion. An instrument adapted to this type of measurement, however, promises to yield much information on the structure of rubber and would furnish a means of comparison of rubber samples in different factories and laboratories.

The ideal instrument suitable for this type of measurement should be of simple geometric and dynamic design to permit precise calculation of fundamental quantities in absolute units and should possess flexibility to allow study over wide ranges of rates of shear, temperatures and thixotropic states. Slippage on the shearing surfaces of the instrument should be eliminated or calculable. If the instrument is to be used for control work, it must be rugged and capable of giving a large number of tests per day.

The second method consists in the measurement of an empirical quantity under conditions closely approaching those existing in processing machines (tubers, calenders, mills, etc.). The major quantities, the values of which in the processing machines should be approximated in an ideal instrument designed on this basis, are: rate of shear, temperature, slippage, and thixotropic state. The instrument should not produce a permanent change in the rubber such as mechanical breakdown. For control work, it must be rugged and, at the same time, yield precise results. Finally, it must have a large testing capacity, that is, must be capable of giving a great number of tests per day.

Instruments for Rheological Measurements

A classification of the instruments used in rheological measurements on rubber consistent with the two general methods just described can now be made. The first class might be termed the semi-absolute type. It includes the Mooney shearing disk *(4)* and cylinder *(5)* instruments. The compression plastometer used in connection with the analyses of Peek *(6)* and Scott *(7, 8)* also falls in this class. The second class would be the empirical type. The principal empirical instruments fall in two groups, the compression group (Goodrich *(13)*, Hoekstra *(14)*, and both of the Williams *(15)* instruments) and the extrusion group (Marzetti *(10)*, Griffiths *(11)* and Firestone *(9)* plastometers).

Space does not permit a detailed discussion of the results of Peek *(6)* and Scott *(7, 8)*. Suffice it to say that the formulae developed in their analyses permit calculation of values of consistency and yield stress from data obtained with the Williams parallel plate plastometer. The Williams plastometer, however, operates only at very low rates of shear. Furthermore, the consistency of the rubber specimen is not measured at thixotropic equilibrium. It is clear then that the application of the results of Peek and Scott is limited to a narrow range of rates of shear and an uncontrolled unknown thixotropic state.

The rotating cylinder plastometer of Mooney *(5)* possesses several desirable qualities. In it the rubber is studied at thixotropic equilibrium. It is designed to give absolute values of consistency (termed shearing viscosity by Mooney) with slippage supposedly eliminated and a constant speed of rotation. The rate of shear with this constant speed, however, is rather low. In an effort to make measurements at higher rates of shear, Mooney imposed transient oscillations on the rubber in the instrument and applied the simple linear differential equation of oscillation with damping proportional to the velocity. He calculated the "viscosity" from the observed damping constant. Since the damping is not proportional to the velocity for unvulcanized rubber, as shown by Mooney's results, this procedure was not justified and the values of "viscosity" obtained at high rates of shear were subject to considerable error.

The Mooney shearing disk plastometer *(4)*, which is the "practical variation" of the cylinder instrument, possesses the advantages of simplicity of design and operation at thixotropic equilibrium. However, in shearing the rubber to thixotropic equilibrium, considerable permanent breakdown occurs. This action of the instrument is clearly shown in the shearing torque vs. time (rotor speed constant) curves of Figure 2, obtained by the authors.

These curves were obtained as follows: A sample of rubber was inserted between the rotor and stator and the chamber closed. After a period of 2 minutes, the rotor was started. The initial maximum torque and the torque readings at one-half minute intervals for 3 minutes were recorded. The rotor was then stopped and the sample allowed to rest for 5 minutes. At the end of this rest period, the rotor was started and torque observations were made again. This process was repeated several times. The curves of Figure 2 were obtained with the rubber at 85° C., those of Figure 3 with the rubber at 100° C. It is seen that the masticating action was much greater at 85° C. than at 100° C. Each point on the curves was the average of 10 observations.

A commendable feature of the shearing disk device is the attempt to eliminate slippage on the shearing surfaces by corrugating both the rotor and stator surfaces. In most cases, this method probably does reduce slippage greatly. However, from results of the authors *(9)* on the variation of shearing torque with temperature and those of Mooney *(4)* it appears possible that slippage does occur in certain cases. In this case, the consistency, as measured by the Firestone extrusion plastometer, was found to decrease rapidly with increasing temperature in the range 85° C. to 110° C. Using the same rubber samples, the consistency measured by the disk plastometer actually was greater at 110° C. than at 85° C.

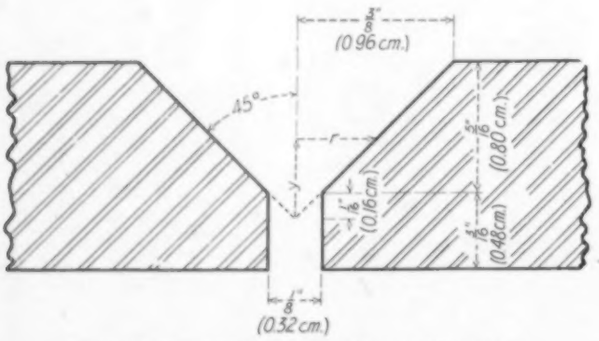


FIG. 4.–GEOMETRY OF DIE, EXTRUSION PLASTOMETER.

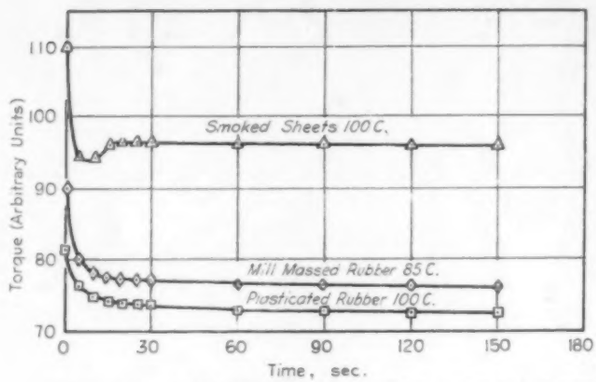


FIG. 5.–SHEARING DISK PLASTOMETER, TORQUE vs. TIME. 2 min. PREHEAT.

One reasonable explanation of the anomaly is that slippage occurred in the disk plastometer but decreased with increasing temperature so that the decreased slippage more than compensated for the decreased consistency to give an apparent increase in consistency at higher temperatures. It should be kept in mind that this is only one of many possible explanations of this anomaly. Nevertheless, until this hypothesis is refuted by experiment,* it must stand as a definitely possible explanation of the effect.

In general, then, it seems that although the shearing cylinder and disk plastometers approach the "ideal absolute instrument" more closely than other devices, there are several details in their design and operation which require change and improvement before they can be considered to meet the requirements of the ideal.

Of the empirical instruments, the compression plastometers (Williams *(15)*, Hoekstra *(14)*, and Goodrich *(13)* plastometers) have the advantage of extremely simple mechanical design. However, the fact that they all operate at very low rates of shear and with the rubber in the "rest" (non-equilibrium) state limits their value. The most recently designed compression device, the Williams pendulum plastometer, operates at high rates of shear. No effort has been made to insure thixotropic equilibrium with it. Hence, neglecting the thixotropic state of the rubber, it appears to be very well adapted for the empirical type of test where only a limited number of tests must be run per day. The fact that samples of special size and shape must be prepared, limits the frequency of test.

The simplest of the extrusion instruments, the Marzetti plastometer *(10)*, is limited in its operation to rates of shear much lower than those employed in processing machines. Although rates of shear as high as 60 sec.$^{-1}$ have been employed in the Griffiths *(11)* extrusion plastometer, its close-fitting piston would appear to be subject to friction, when rubber works in between the piston and the cylinder walls. The fre-

* Since this paper was prepared, Dr. Mooney has shown the authors the results of an experiment (unpublished), which indicates that slippage in the instrument is not the cause of this anomaly.

quency of test is also limited by the necessity of manually loading the cylinder with rubber.

The Firestone extrusion plastometer *(9)*, although it operates over a wide range of rates of shear and is particularly suitable for control work because of its ruggedness and high testing capacity, still does not operate at complete thixotropic equilibrium. No attempt is made with it to limit slippage on the walls of the die. Rather, the die is designed with the aim of securing about the same degree of slippage as found in factory tubing machines. Thus it is in no sense an absolute instrument but is purely empirical in its design. The fact that complete thixotropic equilibrium is not secured appears not to be a serious disadvantage from the empirical standpoint.

This conclusion is drawn from the results of a calculation (see appendix) where it is shown that the degree of approach to thixotropic equilibrium of the rubber in the conical entrance to the die of the Firestone plastometer is of the same order ($3K$) as that of the shearing disk instrument ($9K$), where K is a constant for a given sample of rubber at a given temperature.

The experimental data of Table I show that the "equilibrium" and "rest" values of the torque for the shearing disk plastometer correlate very well. Further, these data show that the extrusion plastometer results agree no better with the "rest" values of the disk plastometer than with the "equilibrium" values. Thus, it may be concluded that the relative values of the efflux rate at constant pressure (used in control work) of the Firestone plastometer should be influenced only slightly by the fact that complete thixotropic equilibrium is not attained.

Conclusion

Reviewing the foregoing analysis of the different methods of measuring the rheological properties of rubber, it is clear that none of the instruments employed completely meets the requirements (as defined) of the ideal absolute plastometer. This unsatisfactory situation has resulted not only from the complexity of the rheological problem for rubber but also from the pressing need for control instruments which correlate with factory processing conditions.

In many cases, it has been found necessary to compromise between the ideal absolute type and the ideal control type. It should not be inferred that the two types cannot be combined into a general absolute instrument suitable for routine control and testing. For example, it is conceivable that a parallel cylinder or disk instrument operating at high rates of shear might meet all the requirements of both research and control. It is also possible that an extrusion plastometer possessing a long small-bore tube and a rotating piston with vanes for shearing the rubber to thixotropic equilibrium before extrusion would be equally satisfactory for both purposes.

In either case, in the light of present experimental data, it would probably be impossible and possibly unwise to eliminate slippage. However, slippage could be calculated by the method of Mooney *(12)* in either case. In any event, granting that several instruments adequate for control now exist, the logical procedure which should be followed appears to be concentration on the development of a satisfactory absolute research instrument. Once that is developed, the problem of adapting it to control requirements could be attacked. Whether or not this final objective is reached, the need for an absolute plastometer, for research purposes only and with negligible value in control, justifies extended research and further expenditure of money by industry.

TABLE 1

Equilibrium Torque vs. Initial Torque Readings of Shearing Disk Plastometer

Type of Rubber	Sample No.	Shearing Disk Plastometer: Tests at 85° C. Consistency Ranking		Shearing Disk Plastometer: Tests at 100° C. Consistency Ranking		Extrusion Plastometer Efflux Rate at 100° C. 3600 lbs./sq. in. piston pressure Consistency Ranking
		Equil. Value	*Rest Value*	*Equil. Value*	*Rest Value*	
Pale Crepe	1	2	3	4	4	1
	2	1	2	5	5	1
	3	1	2	2	3	2
	4	..	..	3	2	3
	5	1	1	1	1	4
Smoked Sheet .	1	2	2	1	2	5
	2	2	2	1	2	4
	3	1	1	1	1	3
	4	1	1	1	1	2
	5	1	1	1	1	1
Plasticized Rubber	1	..	..	1	1	1
	2	1	1	1	1	1
	3	2	2	1	1	2
	4	..	..	1	1	2
	5	1	1	1	1	2
Mill Massed Rubber	1	3	2	2	2	5
	2	**1**	**1**	**1**	**1**	4
	3	**2**	**1**	**1**	**1**	3
	4	**2**	**1**	**1**	**1**	1
	5	**2**	**1**	**1**	**1**	2

Note: Each of the values represented by an integer was the average of several data. The rankings are qualitative, high consistency being represented by larger integers. Where ranks are the same, the observed error was too large to permit discrimination.

APPENDIX

DEGREE OF THIXOTROPIC EQUILIBRIUM ATTAINED

A. In Conical Entrance to Die of Extrusion Plastometer.

The geometry of the extrusion die is given in Figure 4. The rubber undergoes a shearing action in the conical entrance to the die and thus is at partial equilibrium when it enters the die. It is first assumed that a true thixotropic equilibrium exists which is unique for a given type of rubber at a given temperature. It is also assumed that the degree of thixotropic equilibrium (u) is proportional to the product of the mean rate of shear $\left(\overline{\frac{dv}{dr}}\right)$ and the total time of shearing (t).* Then, referring to Figure 4, the average value of u over a disk of radius r and thickness dy is

$$\bar{u}_y = Kt \cdot \overline{\frac{dv}{dr}} \cdot dy;$$

thus, for the whole conical entrance

$$\bar{u} = K \int_{0.16}^{0.96} t \cdot \overline{\frac{dv}{dr}} \cdot dy$$

and the average velocity at a height y is

$$\bar{v} = \frac{E}{\pi r^2} = \frac{E}{\pi y^2}$$

where K is a constant for a given sample of rubber at a given temperature, t is the average time required for the rubber to flow through the cone, v is the velocity of flow at radius r ($=y$), and E=efflux rate from die.

* This assumption is true only to a first approximation.

It has been shown *(3)* that the mean rate of shear for a circular orifice is:

$$\frac{\overline{dv}}{dr} = \frac{32}{15}\frac{E}{\pi r^3} = \frac{32E}{15\pi y^3}$$

Thus

$$t = \frac{0.96 - 0.16}{\overline{v}} = \frac{0.80\,\pi y^3}{E}$$

and

$$\overline{u} = \frac{0.80 \times 32\,K}{15}\int_{0.16}^{0.96}\frac{dy}{y} = 1.69\,K\,.\,log\,\frac{0.96}{0.16}$$

$$= 1.69 \times 1.79\,K = 3K \qquad (1)$$

B. In Shearing Disk Plastometer.

Here it can be shown that the mean rate of shear for a rotor speed of 2 r.p.s. is

$$\frac{\overline{dv}}{dx} = 0.9\ sec.^{-1}$$

From the curves of Figure 5, the time to reach equilibrium is 10 seconds. Thus:

$$\overline{u} = 0.9 \times 10\,K = 9\,K \qquad (2)$$

BIBLIOGRAPHY

(1) No bibliography of the literature on the structure of rubber is given. An excellent bibliography on this subject is to be found in *"Science of Rubber"* by Memmler, American Edition by Dunbrook and Morris, Rheinhold Publishing Co.
(2) The Rheology Leaflet, **1**, No. 1, 4 (1937).
(3) Dillon and Johnston, *Physics*, **4**, 225 (1933).
(4) Mooney, *Ind. Eng. Chem. (Anal. Ed.)*, **6**, 147 (1934).
(5) Mooney, *Physics*, **7**, 413 (1936).
(6) Peek, *J. Rheology*, **3**, 345 (1932).
(7) Scott, *Trans. Inst. Rubber Ind.*, **7**, 169 (1931).
(8) Scott, *Trans. Inst. Rubber Ind.*, **10**, 481 (1935).
(9) Dillon, *Physics*, **7**, 76 (Fig. 2) (1936).
(10) Marzetti, *India Rubber World*, **68**, 776 (1923).
(11) Griffiths, *Trans. Inst. Rubber Ind.*, **1**, 308 (1925).
(12) Mooney, *J. Rheology*, **2**, 210 (1931).
(13) Karrer, Davies, and Dietrich, *Ind. Eng. Chem. (Anal. Ed.)*, **2**, 96 (1930).
(14) Hoekstra, *Physics*, **4**, 285 (1933).
(15) Williams, *Ind. Eng. Chem.*, **16**, 362 (1925).

Ignex—Flame-Proofing Material

FLAME-PROOFING of curtains, drapes, upholstery, rugs, and similar articles, generally considered a complicated process, is said to be made simple by the application of a new flame-proofing material developed by the Laboratory Equipment Company, New York City. The new material has been named Ignex. No special equipment is necessary in its application.

Ignex is a chemical in solution form. It is a clear liquid, non-poisonous, and does not harm even the most delicate fabrics and colors which are not affected by water. Applied by dipping or spraying, the new material is said to have tenacious qualities and does not "powder off" the fabric on which it is applied. It is not visible after application, even on black materials.

Ignex is now being used for the flame-proofing of silk, rayon, wool, cotton, paper, leather and other flammable materials, according to its manufacturer. It has been tested and approved by the New York City Fire Department. Early experiments with it on canvas-rubber cloth are said to have proved sufficiently interesting to warrant further investigation.

German Rubber Industry in 1936

DESPITE Germany's efforts to conserve supplies of rubber and its substitutes, its net imports in 1936 reached a new high record of 71,793 long tons as compared with 62,000 long tons in the previous year, 59,300 long tons in 1934, 54,100 long tons in 1933, and 45,000 long tons in 1932, it is revealed by the Leather and Rubber Division of the Bureau of Foreign and Domestic Commerce. Although general improvement in business conditions caused an increased demand for rubber products, the greatest increase was for rearmament, with motor vehicles in second place. At the end of 1936 there were 2,600,000 motor vehicles in Germany (including 1,200,000 motorcycles) or 600,000 more than at the end of 1934 when the number of motorcycles was slightly over 1,000,000.

The measures of control over the German rubber trade have been numerous, and their review indicates that careful thought has been given to conserving supplies and reduction of requirements. During 1935, one decree banned exports of scrap rubber, and also about two years ago German manufacturers were virtually forced to standardize production; at that time rubber articles of a variety of shades and colors disappeared from the market, rubber footwear was made only in black, all tires black, and most medicinal rubber goods red. A decree of January 23, 1936, limited production of solid tires for domestic use to specific sizes.

By decree of June 22, 1936, the government assumed control of the manufacture, sale and purchase of artificial rubber, and two days later another decree made the vulcanization of tires subject to government permission, placing all enterprises in this work under control. On October 19, 1936, the government authorized the Ueberwachungsstelle fur Kautschuk und Asbest to take necessary steps to provide and keep a reserve stock of rubber in Germany for urgent requirements; this was considered a military measure and any steps taken under this decree are not known.

The decree of January 1, 1937, prohibiting use of rubber in producing 114 listed specialties and small articles except for export, has previously been reported. The imposition of a heavy import duty on natural rubber on May 13, 1937, was to provide revenue for establishing domestic production of artificial rubber on a huge scale and perhaps eventually render natural rubber imports unnecessary.

Manufacturers have been restricted in the kinds and grades of rubber products they may produce, the regulations tending to standardize and improve the quality of articles and also to make more efficient use of local supplies of scrap rubber.

In addition to increased local demand, Germany has increased foreign exports of tires and inner tubes in recent years, also rubber hose and belting, but exports of footwear and certain sundry lines have shrunk. Imports of rubber manufacturers have declined steadily, amounting to only 3,137 metric tons in 1936 against 5,233 in 1935.

To Owners of Noble's "Latex in Industry"

The author has prepared an addenda and errata list which represents not only errors in patent numbers and typography but which includes a number of references originally omitted from the book. This list, in printed form which may be readily pasted into the original copy, is available without cost to all purchasers of the book. Address requests to THE RUBBER AGE, 250 West 57th Street, New York City.

Report of the International Rubber Congress

(Including the Balance of Abstracts of Papers)

By Georges Genin

IN OUR preceding issue we published abstracts of approximately half of the forty papers presented at the International Rubber Congress, held in Paris, France, on June 28-30. This was made possible by the cooperation of Mr. Georges Genin, internationally-known rubber technologist, who acted as our special correspondent at the Congress, prepared the abstracts after sitting in on the sessions, and rushed them off to America on the "S.S. Deutschland" twenty-four hours after the Congress ended, and that of Mr. J. Kottgen who quickly translated the abstracts as soon as they were received in this country. This month, in addition to the balance of the abstracts, Mr. Genin has also supplied a general description of the activities which were part of the Congress. The abstracts follow this description.—EDITOR.

AT THE OPENING session of the International Rubber Congress in Paris, France, on June 28, more than 300 delegates were welcomed in addresses by Mr. Iung, president, French Rubber Syndicate, by Mr. Petithuguenin, representing Colonel Bernard, president, Union of Rubber Planters of Indo-China, and by Mr. E. Fleurent, president, French Association of Rubber Engineers. These three organizations jointly sponsored the Congress. After hearing several papers, the delegates attended a luncheon tendered them by the committee in charge of arrangements for the Congress. The luncheon was held at the famous Palais d'Orsay. The afternoon was devoted to a visit to the Rubber Pavilion which was erected as part of the International Exposition currently being held in Paris.

Description of the Rubber Pavilion

Within the Rubber Pavilion are numerous stands on which are exhibited various products of the rubber industry, indicating the use of rubber in industry, clothing, sports, buildings, etc. One stand, sponsored by the Indo-China Planters group, has a diagram of an Indo-China plantation, indicating the cultivation of *Hevea brasiliensis*, washing and preparation of rubber for shipment, and the social improvement in native life. Another stand contains products made from synthetic rubbers and rubber derivatives, as well as a diagrammatic sketch outlining the various chemical reactions on which rest the manufacture of neoprene, Thiokol, Buna, Plioform, Pliolite, chlorinated rubber, etc.

Still another stand, sponsored by several tire manufacturers, including Dunlop, Goodrich, Bergougnan, Englebert and Michelin, shows an automobile together with all the rubber parts used in its construction. A stand for research and publicity is also maintained through the cooperation of the French Rubber Institute, Dutch Rubber Institute, the Research Association of British Rubber Manufacturers and the Rubber Producers' Research Association.

A small workshop is also maintained in the Pavilion, where the public can see, on a reduced scale, the transformation that rubber has to undergo before reaching the ultimate consumer. A mixer, calender, extruder, press and general laboratory and rubber factory apparatus, are part of this workshop.

Delegates Visit Several Laboratories

Part of the afternoon of June 29 was spent in a visit to the laboratories of the National Office for Research and Inventions (L'Office National des Recherches et Inventions), located at Bellevue in the environs of Paris, in the course of which Messrs. Leduc and Dufour (who presented a paper on the subject) exhibited their apparatus for the radio-vulcanization of rubber and the manufacture of latex thread by radio-coagulation. A gigantic electro-magnet, the largest in the world, is in use at these laboratories. Following this visit, the delegates were taken to the Organic Chemistry Laboratory of the College de France, where Professor Dufraisse pointed out the modern instruments which makes this laboratory, supported by the French Administration of Higher Instruction, one of the finest in the world.

The following day, June 30, was featured by a banquet given the rubber chemists and technologists at the Pavillon Dauphine in the Bois de Boulogne by the Coloring Materials and Chemical Products Society of St. Denis. At the conclusion of this affair, representatives of all the foreign delegations rose to thank the committee in charge of arrangements for the excellent receptions extended them by various organizations, including that sponsoring the banquet.

A final reception took place in the late afternoon of June 30 at the offices of the Paris Chamber of Commerce, at the termination of which the delegates discussed plans for another International Rubber Congress to be held in London in May, 1938, and which is to be especially devoted to the study of the aging of rubber. The thought was also expressed that an International Rubber Congress Committee might also be created, the duties of which would be to arrange a congress each year to be held in different countries. Another function of such a committee, it was believed, would be to determine in advance the rubber problems to be dealt with at the respective congresses.

Before the Congress was officially termed ended, it was announced that all of the 40-odd papers presented at the three-day session would appear in a collection to be published shortly. This book will contain the complete text of these papers, as well as the figures, charts and tables which accompanied them, and also the discussion which followed each one. No price for the collection was made public.

ABSTRACTS

Properties and Applications of Latex

(Omitted from last month's report)

Some Investigations of the Latex-Colloidal Clay System. *By A. van Rossem and J. A. Plaisier (Holland).*

The authors studied the effect of colloidal clay added to latex, from the following points of view: (1) Increase of the viscosity of latex by the addition of colloidal clay; (2) Decrease of the sticky feeling of a latex film after drying, through the addition of a colloidal clay; (3) Use of colloidal clay as a strengthening agent of latex; (4) Influence of colloidal clay on the coagulation of latex by acids. The conclusions reached in this investigation are of great importance from a commercial point of view, and the mixtures of latex and colloidal clay are likely to find important applications.

Properties and Applications of Rubber (Constituents and Preparation of Mixtures)

The Economic Importance of the Reclamation of Rubber in the Last Hundred Years. *By Paul Alexander (Germany).*

The author of this paper presented a very complete historical picture of the use of reclaimed rubber for the last hundred years. He pointed out that at the present time it is estimated that about three-fifths of the natural rubber consumed annually is utilized again on an average at the end of two years in the form of reclaimed rubber. Such use makes considerable savings possible, especially in countries like the United States, where considerably more reclaimed rubber is used in proportion to crude rubber than in the European countries.

Moreover, the use of reclaimed rubber has become of such economic and commercial importance that the collapse of the price of crude rubber did not produce a very important reduction in the quantity of reclaimed rubber used.

The Conversion Points of Rubber: Rackage. *By Paul Bary (France).*

The plastic state of rubber and substances of similar constitution (gels) is a definite state and is limited by two temperatures, the first being that of the melting of the swelling substance, which may be called the plasticizing point, and the second that of the dissolution of the swelled substance in the swelling liquid, which is the melting point.

This hypothesis explains the phenomenon of rackage, which consists in that the rubber, when greatly stretched and kept at its new length in a freezing mixture in which the temperature is lowered, freezes and preserves that length as long as it is sufficiently cold; if it is freely heated, it recovers its initial length and elasticity.

On the other hand, if the rubber is kept so that it can not become shorter and a sufficient temperature is attained, it will be observed that the rubber, when liberated and brought to the ordinary temperature, retains its new length and regains its elasticity.

Rubber in the Manufacture of Gas Masks—Tests for Reception and Control. *By Paul Bourgois (Belgium).*

After drawing attention to the many uses of rubber in the manufacture of gas masks, the author described the various tests for reception and control these articles have to undergo, such as: Examination of the face coverings and accessories—tightness of face coverings, elastic of head band, plate of head band, valve; examination of the caterpillar tubes—tests for tightness, determination of respiratory difficulty, stretching tests; tests for impermeability—impermeability to mustard gas, to benzyl bromide, to solvents, tests in tear gas atmosphere, test for diffusibility; chemical analysis and aging test—resistance to ignition, hardening in the cold, resistance to disinfecting agents, etc.

Uniformity Control of Carbon Black. *By H. Walter Grote (America).*

There are 18 distinct tests performed daily in the laboratories of the major carbon black producing companies for the express purpose of controlling the uniformity of the production. The author listed these tests, which included tests for grit; moisture; ash; volatile matter; acetone extract; accelerator adsorption and pH value; turbidity tests (wherein a standard aqueous dispersion of carbon black is left to settle in a 200 c.c. graduated cylinder for a given length of time after which a light ray, after passing through the dispersion at various levels, is impinged upon a photo-electrical cell which records a numerical value); dispersion tests made in either a Schiller mixer or a Banbury; plasticity tests; resiliency tests (rebound pendulum); tests to determine the tendency towards tread cracking; tear resistance and abrasion tests; and finally a hardness test.

He also described a new laboratory extrusion apparatus which was developed to accurately predict the processing qualities of a rubber stock containing carbon black. With this apparatus a compound consisting of 100 parts of rubber, 55 of carbon black and 4 of stearic acid, mixed under standard conditions on a laboratory mill, is extruded through a ⅛th-inch die and an accurate measure of the grammes extruded per minute is taken; also the minutes to extrude 5.5 c.c. of the material. By dividing the former through the latter, a factor is obtained which gives an accurate indication of the processing quality of the black.

Porous Rubber. *By G. Genin and J. Lusinchi and (Miss) A. Scherrer.*

Having given a description of the principal porous and microporous types of rubber that are being produced commercially, the authors described a method of measuring the electric resistance of the microporous plates of ebonite used as separators in storage batteries. This method permits the determination of the essential electrical characteristics of the various types of microporous ebonite to be found in separators now being sold. Tests include: Electric resistance at ordinary temperature; Variation of electric resistance as a function of temperature (in particular at the temperature of —20°); speed of impregnation of the different separators by the acid electrolyte of the lead storage batteries.

The Application of High Frequency Currents in the Rubber Industry. *By Henri Leduc and Dufour (France).*

High frequency currents may be utilized to vulcanize rubber mixtures by employing the evolution of heat manifesting itself throughout a mass of rubber placed in an electric field of high frequency (1 to 10 million periods per second or more). The heating of the mass no longer depends on thermal conductivity, but the heat is originated within the rubber itself with a speed attaining 50° C. or more per minute of heating. In this manner, belts and rubberized fabrics and rubber paving blocks have been vulcanized, and by the same method latex may be spun and round or square threads obtained, as well as tires, sheets, etc.

Universal Apparatus for the Study of Aging. *By Paul Walter (France).*

This apparatus consists substantially of a closet without pressure, having an interior volume of 500 x 400 x 400 mm., entirely of metal and heat-insulated, provided with a sight of special glass permitting one to observe the state of the samples undergoing tests. The interior of the closet has a special aero-dynamic profile permitting the mixing of gases and the establishment of a uniform temperature throughout the interior of the closet. A high-tension quartz lamp is provided, the light of which is rich in ultra-violet rays, as well as an electric heating device with an automatic heat regulator, and the apparatus enables one to effect the aging, under the most diverse conditions, of 24 samples at once, whether such samples be liquid or solid.

Static Theory of the Elasticity of Natural and Synthetic Rubbers and Similar Substances with Long Chain Molecules. *By Hermann Mark (Austria).*

After expounding the static theory of the elasticity of rub-

ber, considering first the case of an ideal rubber, and then that of the real rubber, the author pointed out that the differences to be observed from the elastic point of view between natural rubber and synthetic rubber, are due to the fact that the natural substances have a regular chemical constitution, whereas in the case of the synthetic products there always occur interlacings, phenomena of cyclicism and other irregularities that cause the synthetic product to deviate far more from the ideal elastic substance than natural rubber. This irregular chemical constitution also explains why the synthetic products as a rule stretch less than natural rubber.

Suspensions in Rubber. ***By Konrad Oeser (Germany).***

Mathematical investigation of the phenomena of the damping of vibration by rubber. The author showed how, by the solution of differential equations, it is possible to establish for each machine the conditions under which suspension must be effected in order to dampen vibrations under the best conditions. Some examples of practical application were given, particularly concerning the fixing of air compressors on the chasses of cars.

Influence of Vulcanization on Oxidability in Relation to Aging. ***By Charles Dufraise and Andre Etienne (France).***

It may be said that the oxidability of rubber increases with the quantity of combined sulfur. But in extreme amounts the part played by the combined sulfur changes, and beyond a certain zone limit it becomes more and more harmful. In this case, the curve of oxidability as a function of combined sulfur tends to become a level stretch. Beyond another lower zone limit, on the other hand, sulfur appears to behave as a protector, and the curve of oxidation passes through a minimum, which is moreover rather close to its origin.

To explain this latter phenomenon, it may be imagined that the most reactive double bonds of rubber are those on which the sulfur quite naturally acts and, as the first effect of the combination of small quantities of sulfur, a decrease in the oxidability in consequence of the disappearance of the reactive bonds which render this rubber more oxidizable is established.

Some Tests of Anti-Aging Agents. ***By F. Jacobs (France).***

An investigation of different agents against aging, from the point of view of their action on the resistance to oxidation of mixtures and the resistance to repeated flexures.

Test for the Rational Determination of Bulging in the Calender Cylinders. ***By A. R. Dichvili (Belgium).***

The author expressed the hope that he would one day be in possession of sufficient facts to be able to predict with certainty from a given rubber, whose absolute viscosity should be a known function of the temperature, and from the speed of the rotation of the cylinders, whether the cylinders of the calenders for drawing sheets must be convex, and what must be the numerical value of this bulging.

Where this bulging could be prevented, it should likewise be possible to indicate by the application of the same formulas the rigidity of the cylinders of the calender and the total tightening force for eliminating bulging.

Mechanical Applications of Rubber. ***By Maurice Julien (France).***

The author studied the static, dynamic and pseudo-static applications of rubber. Rubber owes its essential applications to its physical and chemical characteristics, and especially to its physical characteristics, the most important of which were also examined by the author—elasticity, hysteresis, noise deadening qualities, etc.

pH Properties of Colloidal Carbon. ***By W. B. Wiegand (America).***

The author shows that sludges of carbon pigments and water are capable of affecting the potential of a glass electrode giving pH values ranging from 2.6 to 10.5. These pH values are found to correlate with volatile matter and D. P. G. adsorption and, more significantly, are capable of influencing the behavior of the carbons in the vulcanization of rubber and in the drying of paints. Acid carbons retard vulcanization and drying, while basic carbons do not. By combining pH, volatile matter, and D. P. G. adsorption, it is possible to classify carbon pigments into four groups.

All evidence points to the conclusion that the pH properties of carbons are chiefly adsorptive in origin and not of an extractable nature. Prolonged extraction with water or organic solvents has little effect on the pH of impingement carbon sludges.

Since the results show that the higher the oxygen content of the carbon the lower will be its pH value, it is suggested that the amount of the $C^{n}O^{y}$ complex on the surface of the carbons influences the pH and adsorptive properties of the carbon.

Improvement in the Technique of Testing and its Importance in Scientific and Technical Research Work. ***By B. D. Porritt and J. R. Scott (England).***

The purpose of this investigation was to show the difficulties presenting themselves when it is necessary to make tests on rubber; especially endurance tests. Numerous errors are still current in this field, both with respect to the method of preparing samples and the selection of tests to be made and the conditions under which such tests are carried out.

Above all, it will be necessary to perfect accelerated methods of aging that furnish results that are absolutely comparable to those that may be obtained in practice. It would also be advantageous to have in each country a greater uniformity in the methods of testing adopted by various groups and to establish likewise a closer bond between the bodies charged in each country with the setting-up of test methods and specifications applicable to rubber. International collaboration should be established before the countries have taken a definite stand on such uniformity.

Conversion of Old Tires with their Entire Constituents of Plastic Material. ***By Ern Bemelmans (Holland).***

The author described a new reclaiming process that permits treatment at a much lower temperature than the ordinary temperature of vulcanization, which would formerly have been thought impossible. The heat acts alone to produce the plastic condition, which is due to the depolymerization of rubber.

The essential feature of the process is that, instead of operating in the presence of an alkaline liquid, it has been determined that it is much more economical to render the medium alkaline in the dry manner by using substances becoming gaseous under the conditions of reclamation. These alkaline gases are stirred during treatment; they penetrate readily into the old tires without the latter being previously ground; they dissolve in the mass and depolymerize the rubber. For example, ammonium carbonate, which decomposes into 32.5% of ammonia and 56% of carbonic acid, is utilized as the material giving rise to alkaline gases.

Active and Inactive Carbon Blacks in the Past, Present and Future. ***By Werner Esch (Germany).***

This study is a very complete historical account of the question of carbon black and its use in the rubber industry. The author enumerated the different blacks that appeared successively in the industry, described briefly the method of their production, their essential characteristics, and their principal applications, giving various formulas that show under what conditions the active and inactive blacks must be employed.

Remarks on the Viscosity of Rubber Solutions. ***By E. Guth (Austria).***

An investigation of the properties of viscosity of natural rubber and Buna (Germany's synthetic rubber) made by means of the Hoeppler viscosimeter. The author showed how the viscosity features of natural rubber solutions may be compared to the physical and chemical constitution of the synthetic product.

General's Mechanical Goods Plant

Operations are Already Under Way With Plans Calling for the Eventual Production of 5,000 Rubber Products

OPERATIONS at the recently-opened plant of the mechanical goods division of the General Tire and Rubber Company, at Wabash, Indiana, have been under way for the past two months and are rapidly gaining momentum so that it is expected that the present operating force will be tripled by the end of year. Installation of machinery is rapidly being completed, although most of the larger pieces of equipment have already been installed. The first rubber products were produced experimentally at the plant on March 8, 1937, after five months had been spent in reconditioning the buildings and installing machinery, under the direction of Howard M. Dodge, general manager of the plant.

According to present plans, about 5,000 different articles for use in the automotive, refrigeration and allied industries will be produced at the Wabash factory when in full operation. When fully equipped it is believed that the plant will be one of the most complete and modern in the country. Annual production volume is expected to total approximately $5,000,000. Some 175 workers are now employed and this number should be increased to 500 by the first of next year. The 15 departments which make up the plant will eventually employ about 1,000.

Referring to the variety of products to be manufactured by the mechanical goods division, W. O'Neil, president of General Tire, stated, "As a multitude of new uses for rubber in industry are being developed each year, the possibilities of future expansion in the mechanical goods field are practically unlimited. The amount of rubber that is used in the construction of the modern motor car, outside of tires, is not generally realized. In the past few years, the amount of rubber, exclusive of tires, in the average automobile has increased from about five pounds to more than 40 pounds. It is not unreasonable to expect that as much rubber will soon be used in the construction of a car as is used in the tires themselves. Automobile companies today are the largest single users of mechanical rubber goods."

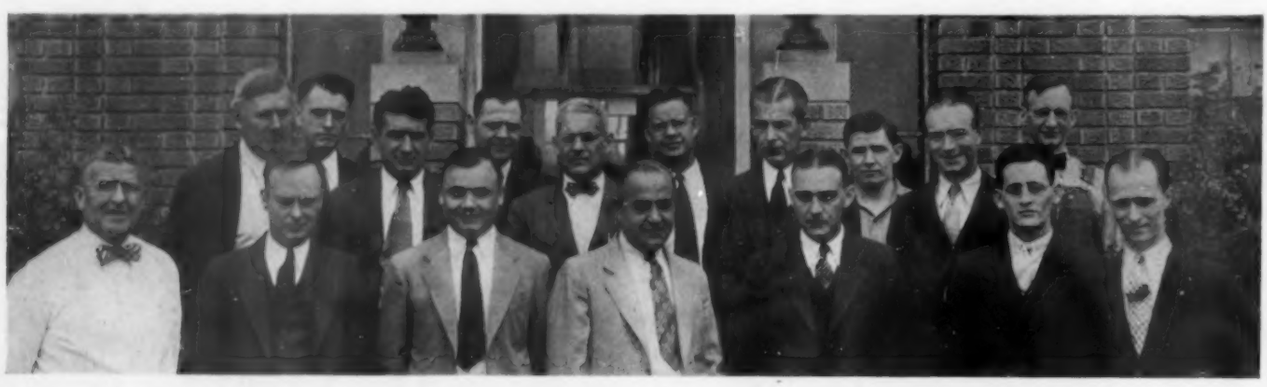
Development of rubber rolls for printing presses and of rubber drums for the transportation and storage of hydrofluoric and other acids destructive to metal (heretofore made in General's factory at Akron) will play an important role in the new plant's operations. Eventually, General expects to enter the field of various novelties, such as toys, play-balls, and similar items, distributed through premium outlets.

In this connection, General Manager Dodge points out that the application of rubber to mechanical rubber articles and other products is expanding by leaps and bounds, with no saturation point in sight. "We have within our organization, both at Akron and at Wabash, facilities for developing any conceivable rubber or synthetic rubber product and we expect to play an important part in the development of synthetic materials," he said, and added that it is likely that the company will participate in the development of plastics.

The development of a new method of adhesion which is said to eliminate the old method of brass-plating and forms a strong bond between rubber and metal, is also under way at the Wabash plant, according to Mr. Dodge. This new method is expected to be particularly applied to rubber mountings used in machinery construction where vibration dampening qualities are essential.

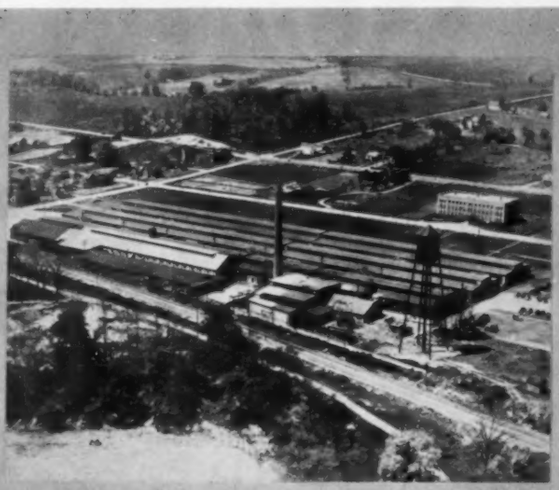
The Wabash factory is so laid out that machinery and equipment will occupy the major part of the 228,669 square feet of gross floor area available. The buildings making up the plant are of brick and steel construction, and are located on a 30-acre tract of land adjacent to the main line of the Wabash Railroad. Proximity of the railroad is advantageous to the company for both shipping finished products and receiving raw materials.

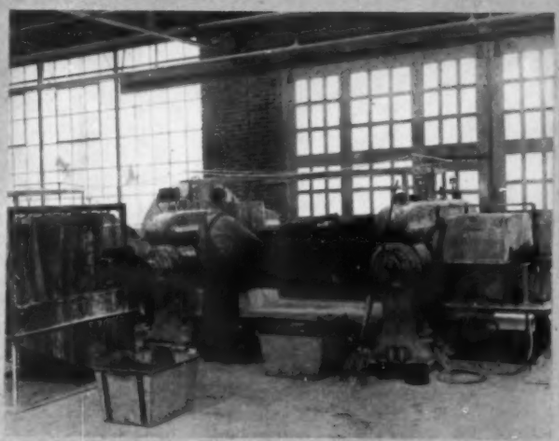
The sales volume of mechanical rubber goods accounted for 21.4% of the total sales in the industry thus far this year, according to figures compiled by the Rubber Manufacturers Association. This marks an increase of 1.6% over the 19.8% recorded for the corresponding period of last year. In the same period of 1934, however, the sales volume of mechanical rubber goods amounted to only 16.2% of the sales volume of the industry as a whole.

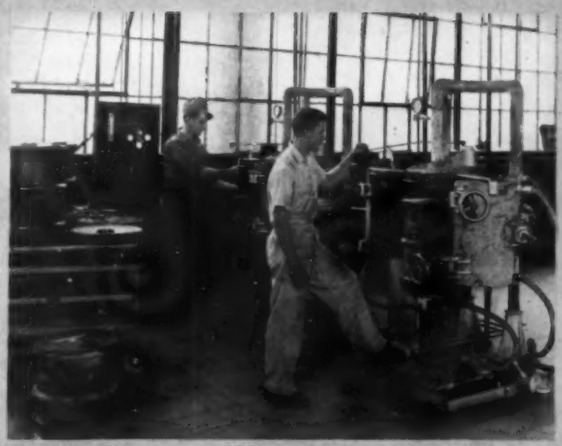


Factory and office personnel of General Tire's new Wabash plant, reading from left to right: Front Row—R. P. Hassler, production superintendent; H. G. Beck, engineer; C. P. Bender, sales; R. O. Dutt, purchasing and traffic; William Wright, sales; W. J. Gurtner, accounting; and C. A. Smith, cost. Middle Row—Lou Baldwin, receiving and shipping; S. J. Wargo, processing and time study; H. J. Conroy, technical superintendent; C. W. Tyte, sales; and L. F. Snavely, cost. Back Row—Russell Bush, drafting; H. M. Dodge, general manager; Gilbert Swart, chemist; Frank McCafferty, raw products; and Henry Treckman, master mechanic.

Views of General Tire's New Wabash Plant







Top: An aerial view of the Wabash plant which occupies a 30-acre tract of land.

Center: The 84-inch mill line where masterbatches are made for processing.

Bottom: Type of equipment used for the vulcanization of the all-rubber acid drum featured by General.

Top: Forty double-opening, 34 x 32, 600-ton presses, and twenty 24 x 24 two-opening, 260-ton presses, are in this mechanical goods press room.

Center: Battery of hydraulic presses for vulcanizing sponge rubber.

Bottom: Tubing machines in operation.

Heat Resistant and Latexed Cords

TWO new tire cords, designed to meet present day conditions, have been developed by the Bibb Manufacturing Company, Macon, Georgia. These cords have been named "Heat Resistant Cords" and "Latexed Cords." According to Bibb officials, they are the result of years of experimental work and have been placed on the market only after long and severe tests in which millions of pounds of cotton were used.

It is claimed that these cords will not only produce a tire showing a minimum of growth, but at the same time resist the effects of high temperatures to a degree never before approached in any cord fabric. The outstanding features of these new cords are low stretch, low gauge, high break, high recovery value, increased safety and added mileage. Particular attention is directed to the unusually high bone dry break value as compared with tests under normal conditions.

Less Fabric in Tire Construction

It is also pointed out that because of the fact that "Heat Resistant Cord" runs approximately 10% lighter than regular cord without any lowering of tensile strength, less fabric is needed in the construction of a tire. The cord is therefore economical as well as carrying all of the advantages claimed for it which have been described above. The cords were especially designed for use in heavy duty truck and bus tires, which are subjected to the most severe operating conditions, but they are equally satisfactory for use in passenger car tires.

Some interesting tests have been made by the Bibb company and charts shown in a booklet which they have just issued show on a direct heat test at 300° for 36 hours that both "Heat Resistant" and "Latexed" cords have much higher break values than regular cord, wet twisted cord or synthetic cord. Another chart dealing with the recovery test where the cords were heated to a temperature of 300°, then removed and conditioned in an atmosphere of 6½% regain for 36 hours, also shows the recovery value of both new cords to be superior to synthetic cord, regular cord and wet twisted cord tested at the same time.

The Bibb Manufacturing Company, with mills at Macon, Porterdale and Columbus, Georgia, is one of the oldest tire fabric manufacturers in the country and has played an important part in the development of tire fabrics. They claim to have been the first to produce a cord fabric that was acceptable to the tire trade. They are very enthusiastic over their new cords on which patents have been applied for and are now in process of issuance. The company's general office is in Macon, Georgia, with branch offices in New York, Akron and Chicago.

Rubber Lubrication Composition

THE use of rubber parts in machinery of various kinds has greatly increased in the past few years. The use of rubber mechanical elements is particularly noteworthy in the automotive industry, where rubber is now used in the spring shackles of automobiles, in weigh bar bearings, trunnions, axle spring seats, motor mountings, etc. The lubrication of these rubber parts has presented a troublesome problem because of the softening action of the usual lubricating agents and compositions. This problem is said to be overcome by a new composition, of which colloidal graphite is an important constituent, designed especially for such lubrication.

A patent on this new composition was recently granted to George F. Willson, Cleveland (Ohio) representative of the Acheson Colloids Corporation of Port Huron, Michigan, and assigned to that company. Executives of the corporation explain that as manufacturers of "dag" colloidal graphite they are not marketing a ready-for-use product, but are merely licensing various oil companies to use the formula which calls for the use of that graphite. The formula consists chiefly of a combination of the "dag" brand colloidal graphite, glycerine and water. The license to use the formula is granted without any fee or royalty considerations.

It has been found in applying this new rubber lubricant that where surfaces are restricted and difficult to reach a needle spray gun is effective and where areas are greater and more readily accessible, guns giving a wider coverage are useful. Several oil companies have taken licenses to produce the new composition and are already supplying the lubricant under various trade and brand names.

Nuba—A New Resinous Pitch

A NEW dark thermal-softening plastic — termed Nuba — has been developed by the Neville Company, Pittsburgh, Penna. Brown to black in color, the new resinous pitch is partially soluble in petroleum solvents upon warming, and almost entirely soluble in aromatic solvents. Its outstanding properties are toughness and elasticity. It softens upon being heated and may be blended with several other thermoplastic materials, such as waxes, resins, pitches, etc., by first melting these materials and then adding Nuba, followed by mechanical agitation until completely blended.

Nuba has been made available in several grades: 80-95° C., 100-125° C., and 135-150° C., melting points. All grades are insoluble in petroleum benzine and benzol, and have ash contents ranging from 13 to 27%. They are solids and have grainy fracture forms. Penetration (100 gms., 5 seconds) at 77° F. ranges from 0 to 6, and at 125° F. from 6 to 180. It may be used as a compounding agent in rubber formulas, particularly as a softener and filler.

Fatty Acid Pitch Partially Eliminated

The use of Nuba in floor tile compounds is said to partially eliminate the use of a fatty-acid pitch, thereby improving the alkali and soap resistance of the finished product. In such compounds, the new material is reported to exhibit good penetration characteristics and to impart good wear-resisting qualities. When used to replace other compounding materials in floor tile compounds, Neville engineers recommend the use of a Nuba of about 15° C. higher melting point than the material it replaces, because it exhibits a tacky quality over a wider temperature range than is usual.

The new resinous pitch has several uses outside of the rubber industry. It may be used in the production of leather dressing compounds, polishes, etc., as well as for components of composition insulating blocks (such as switch and terminal blocks). By comparison with the usual roofing pitches, melting point for melting point, Nuba is said to have somewhat less tendency to "cold flow" and is therefore advantageous for use in steep roof coatings.

Book Reviews

Synthetic Rubber. By W. J. S. Naunton. Published by Macmillan & Co., Ltd., St. Martin's Street, London, England. 5½x8½ in. 162 pp. 7s. 8d. (approximately $2.00 at the current rate of exchange). The first book devoted solely to the subject of synthetic rubber since the publication of the monograph by S. F. Schotz (published by Reinhold) in 1926, this volume differs from the other in that it not only treats with the chemical aspects of the subject, but also deals with the technical and economic sides. As the author states in his preface, the subject is handled "from as wide an angle as possible, so as to interest both the layman who is interested in the history of man's attempts to produce rubber synthetically and the more technically-minded reader." The book contains 9 chapters, in addition to a lengthy introduction by Professor Sir William J. Pope (University of Cambridge). The chapters are devoted to the history, economic aspect, chemistry, physics, technology and applications of synthetic rubber. Other chapters treat with the borderland between rubber and resins, synthetic rubber latex and the future outlook of the material. The technical section of the work is devoted almost entirely to neoprene, DuPont's chloroprene rubber.

•

Elasticity, Plasticity, and Structure of Matter. By R. Houwink. Published by University Press, Cambridge, England. (also available from the MacMillan Company, New York City). 5½x8½ in. 376 pp. $6.00. It is the expressed intention of the author to bring the three groups of workers interested in the study of elastic and plastic phenomena which takes place upon the deformation of matter—*i.e.*, the physicist, the chemist and the scientific technologist—into closer contact with each other, so that by the aid of an insight into the structure of matter they may seek to improve existing materials and discover new ones. By a series of comparative tests, he makes certain prophecies about the behavior of materials upon deformation on the basis of their respective structures, wherein (he claims) lies the key to the deliberate synthesis of materials with definite desired elastic and plastic properties. The book is divided into 13 chapters, one of which deals with rubber, gutta-percha and balata, discussing the chemical structure of rubber and its changes during vulcanization, the elastic behavior of rubber, molecular structure, "artificial" rubber, etc. The book has a complete author and subject index. In addition to contents described, it also has a special chapter on "The Plasticity of Crystals," by W. G. Burgers.

•

Gum-Elastic. By Charles Goodyear. A facsimile reproduction of Goodyear's original book by Maclaren & Sons, Ltd., 38 Shoe Lane London, E.C. 4, England. 5½x8½ in. 600 pp. 31 plates. 15s. 9d. (approximately $4.00 at the current rate of exchange). Because copies of Goodyear's *"Gum-Elastic"*, originally published in two volumes, *"Gum-Elastic and Its Varieties, with a detailed account of its Applications and Uses, and of the Discovery of Vulcanization"* and *"The Applications and Uses of Vulcanized Gum-Elastic, with Descriptions and Directions for Manufacturing Purposes,"* respectively, are rare, and because the principle of many new rubber processes can be traced back to this historical work, Maclaren & Sons (publishers of the *India-Rubber Journal)*, began the reproduction of individual pages from the book in their weekly rubber journal and later collated all of these reproductions into book form. Although the plates and figures are unnumbered and several references are admittedly incorrect, the reproduction closely follows the original book. It should be included in every collection of rubber books.

•

Dictionnaire Technique du Caoutchouc (Technical Rubber Dictionary). Compiled by L. Akobjanoff. Published by Revue Generale du Caoutchouc, 19 Boulevard Malesherbes, Paris, France. 5x7 in. 174 pp. 45 francs (approximately $1.75 at the current rate of exchange). This handy little dictionary, published in English, French, German and Russian, should find wide application in the rubber industry. It is not a dictionary in the full sense of the word, since it gives no definitions of the technical terms listed, but will rather serve a useful purpose in enabling one to determine the English, French, German or Russian equivalent of a technical term in any of the four languages. English words appear first, followed by French, German and Russian equivalents, respectively. Each individual word is numbered. Since the English words are first, it is simple to locate them in their alphabetical sequence. French, German and Russian words are alphabetically arranged in indexes at the back of the book, with numbers referring the user to the English equivalent, or other language equivalent.

•

Stabilog Process Control in Industry. Foxboro Company, Foxboro, Mass. 8½x11 in. 32 pp. This catalog (Bulletin No. 175-1) describes a new system of automatic control of temperature, pressure, level and flow in continuous processes, which takes into consideration the rate of change of the condition being controlled. Several photographs show industrial plant applications of this system. Explanatory notes point out the characteristic features of the company's Stabilog controllers. Temperature, potentiometer, pressure, level, flow and ratio flow controls are also described and illustrated.

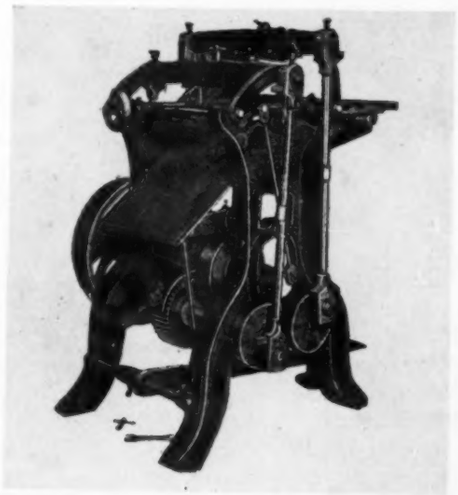
•

Monastral Fast Blue BS. Organic Chemicals Department, E. I. du Pont de Nemours & Co., Inc., Wilmington, Delaware. 6x9 in. 20 pp. This booklet treats of the uses of Monastral Fast Blue BS, a new pigment recently made available by the company, in various industries, including rubber. It tells in what forms the various types are available. In several instances, samples of the new shades are shown.

New Equipment

Knox Sole Blocker

SEVERAL improvements have recently been added to the Knox Sole Blocker, a product of Quarmby and Hilliker, Lynn, Massachusetts. Although this machine has been in use in the leather industry for approximately 40 years it recently was adopted by manufacturers of rubber and other types of composition soles. This cutting machine, which incorporates



a number of patented features, is said to be capable of cutting 10,000 to 12,000 pairs of rubber soles per 8-hour day. The company also features a rubber stripping machine for cutting rubber tile, leather, leather board, and other materials.

Editorial Comment

Standardization of Tire Sizes

ALTHOUGH there has been no centralized or group effort to standardize tire sizes, the past few years have witnessed a trend toward 16-inch tires. For the first time in automobile history, tires of this size were standardized on all models of the "Big Three"—Ford, Plymouth and Chevrolet—when the 1937 models were introduced late in 1936. They are also standard on a few of the higher-priced, heavier models as well.

Standardization of tire sizes brings benefits to practically every one concerned. To the automobile manufacturer it means less of a stock problem; to the tire dealer it means actual savings in that he need not tie up as much of his capital as heretofore because of the required multiplicity of sizes needed for replacements; and to the tire manufacturer it means the increased production which comes with specialization.

The statistics of the past few years indicate the trend toward standardization of the 16-inch tire. Approximately 20% of the total cars registered in 1934 carried 16-inch equipment. This figure increased to 40% the following year. Another jump—to 55% of the total number of cars—was recorded in 1936. The percentage is expected to reach 75% by the end of the current year.

There is no assurance, unfortunately, that the 16-inch size tire will continue to hold its current popularity. Already a tendency has been noted among the automobile manufacturers to build smaller wheels. It is safe to predict, however, that quasi-standardization will hold good for the next several years, particularly on replacements.

•

Status of the Rubber Industry

SINCE the improvement recorded by any industry is reflected in the earnings of companies making up that industry, it is gratifying to note the financial progress being made in the rubber field. Reports made within the past sixty days, reflective of earnings in the first six months of the current year are particularly encouraging. Goodyear earned a net income of $8,068,352, or almost two and one-half times as much as the $3,598,683 reported in the corresponding 1936 period; U. S. Rubber increased its profit in the comparative period from $2,187,902 to $4,500,609; Firestone recorded a 37% increase, from $2,754,675 to $3,766,006; General Tire made $991,262 in 1937, and although no comparative figure is available because this is the first time the company has made a semi-annual statement, the profit was substantially higher than for the first six months of last year.

Increased activity along construction lines is another good barometer for any industry. Here, too, the rubber industry shows activity. General has completed its new mechanical goods plant at Wabash, Indiana; Goodyear will soon open its Jackson plant; Goodrich has completed renovations at its Oaks (Pa.) factory for tire production and is completing installation of machinery at the new Cadillac (Mich.) plant; Inland Manufacturing (rubber producing division of General Motors) will build a new factory in Clark Township, N. J.; Premier is adding to its buildings at Dayton; Dayton Rubber is renovating the former McClaren Tire plant at Charlotte.

The statistics show the reasons for these increased earnings and building activities. Tire sales, both original equipment and replacements, are higher than they were last year; mechanical rubber goods sales have topped all previous totals; footwear sales are on the increase; etc. These statistics, plus the fact that prices on rubber products, particularly tires, have been maintained well above cost margins, are in the main the basic reasons for the healthy position of the industry as a whole.

•

Another Look at Restriction

THAT the International Rubber Regulation Committee has made wide, if discriminate use, of its powers is evident from a retrospective glance at the permissible quota allowances since the inception of the scheme in 1934. Starting with an allowance of 100% of basic quotas in the June-July, 1934, period, the allowance dipped as low as 60% in the October-December, 1935—January-June, 1936 period, and is now set at 90% for the July-December, 1937, period. A clear picture of the development of the statistical position follows:

In 1933, countries now signatories to the restriction scheme shipped a total of 839,000 tons; 1,017,900 tons were shipped in 1934; 810,200 in 1935; and 843,033 tons in 1936. World consumption rose from 821,400 tons in 1933 to 1,015,678 in 1936. World stocks (including afloat) dropped from 616,370 tons at the end of 1933 to 429,729 tons at the end of 1936. The price of rubber rose from an average of 5.96 cents per pound in 1933 to 16.41 cents per pound in 1936.

These figures reveal that the Restriction Committee has achieved most of its objectives. Its problem is now to retain them and at the same time find some method of "controlling" the price situation. In the latter problem may be found the crux of the entire restrictive scheme.

CURRENT • NEWS
of the Rubber Industry

AUGUST, 1937

COMMITTEE D-11 HAS ANNUAL MEETING

Report Made on the Membership as Well as Announcements of Election of New Subcommittee Chairmen and New Standards

Committee D-11 on Rubber Products of the American Society for Testing Materials held its annual meeting at the Hotel Astor in New York City on June 30 in conjunction with the 40th Annual Meeting of the Society. (A report of the A.S.T.M. meeting, together with a description of the rubber testing apparatus which was exhibited, appeared in the last issue of this journal).

A report on the membership of the Committee revealed that two members C. W. Mowry and J. E. Chapin—had been lost by death, with N. J. Thompson having been designated to succeed Mr. Mowry, and that the following members had resigned since the previous meeting: Frank Zeleny, E. H. Grafton, H. W. Asire and W. R. Marsden. It was also stated that Stanley Krall and J. E. Partenheimer, both of Fisk Rubber, had been replaced by W. J. Geldard, and that G. P. Mooshegranz had replaced Louis DeHolczer for Jenkins Bros.

Several Members Added

New members added to the Committee included Alfred Bellis (Roebling's Sons), D. E. Baker (Monsanto), H. S. Karch (Lima Cord Sole and Heel), W. H. Reynolds (American Instrument), B. J. Barmack (Commonwealth Edison), and A. W. Staller (Crescent Insulated Wire). Additional company representatives are: J. E. McGraw (General Electric), David C. Scott, Jr. (Scott), M. G. Shepard (U. S. Rubber), and R. V. Yohe (Goodrich). E. D. Youmans has replaced C. R. Boggs as representative of the National Electrical Manufacturers Association, while E. W. Schwartz has also been added as a representative of this group.

The secretary (Arthur W. Carpenter of Goodrich) also reported that L. M. Freeman has been appointed chairman of the Subcommittee on Tests of Liquid Rubber Products, organized at last year's annual meeting and that Messrs. R. A. Schatzel, H. M. Frecker, M. E. McDonnell and P. L. Wormley had been elected to the Advisory Subcommittee. It was also stated that the revisions of the Tentative Specifications for Insulated Wire and Cable: Class A, 30% Hevea Rubber Compound (D27-35T) and for Insulated Wire and Cable: Performance Rubber Compound (D353-35T), which were presented to the A.S.T.M., subsequent to the 1936 annual meeting, were accepted during the year by Committee E-10 on Standards and are part of the 1936 *Proceedings*.

Reports from various subcommittees were made, including the following: *Mechanical Rubber Hose*—undertaking a consolidation and amplification of A.S.T.M. Standards D-379 and D-380 on testing rubber hose; *Protection of Persons from Electrical Shock*—expects to recommend revisions in the Standard Specifications for Rubber Gloves (D-120-23); *Insulated Wire and Cable*—preparing specifications covering tough rubber sheath compounds for cables and for heat - resisting compounds; *Tests for Properties of Rubber and Rubber-Like-Materials in Liquids*—has agreed on details for a standard testing method, i.e., size of test pieces, liquid to be the same as in actual service, equipment, methods of measurement, and conditions of test.

Before concluding its meeting, the Committee also proposed a tentative method for air pressure heat test of vulcanized rubber. This method is now regarded as a tentative standard, and as such is subject to annual revision. Any revision suggested during the coming year will be presented to the membership at the 1938 meeting.

Turning Point of Stocks?

According to available statistics world stocks of crude rubber at the end of March, 1937, amounted to 497,564 tons in comparison with 484,600 tons at the end of the preceding month. This gain of 12,964 tons represents the first increase in world stocks since their sustained decline began in 1935. Although world stocks will probably see-saw for a few months before a sustained upturn makes itself felt, it is probable that the March statistics reveal the turning point.

GOLFERS REPLY TO MONOPOLY CHARGES

Professionals Allege That Wide Range of Golf Balls Produced at Various Prices Makes Monopoly Practically an Impossibility

In reply to the charges filed against it by the Federal Trade Commission, the Profesional Golfers Association of America has asserted that the wide range of golf balls produced at various prices makes it impossible for any concern or individual to enjoy a monopoly in the field or to fetter competition. The Commission filed a complaint on June 30 against the golfers' association, the Golf Ball Manufacturers Association, their officers, and several members of both groups. The Professional Golfers Association filed its reply on July 28.

An Altruistic Organization

The golfers' association explained in its reply that it is primarily an altruistic service organization and that the business end of the organization, consisting of the sale of trade-marked golf balls and other supplies, was incidental to the main purpose. It further explained that several of the leading manufacturers agreed to manufacture the association's "PGA" golf ball, pay it a royalty for the use of the trademark, in an effort to help the association which maintains a benevolent fund for relief of members.

According to the F.T.C.'s complaint, a part of these royalty payments was passed on to individual members of the golfers' association, the result being to give the professionals a lower price than competing dealers, which is in violation of the Robinson-Patman Act and comes under the head of "unfair trade practices." The Commission further charged that in addition to the benefits of this royalty agreement, PGA members generally were given lower prices than were made available to dealers, by means of special discounts from the list prices.

Finally, the Commission alleged that both the golf ball manufacturers and professionals discriminated in price between different purchasers of golf balls of similar grade and quality, the effect being to lessen competition and to create a monopoly. The PGA's replay refutes this charge.

ROBERTSON PREDICTS INDUSTRIAL GAINS

Although there is some feeling in the trade that January estimates for the rubber industry were over-optimistic, the outlook for the second half of 1937 justifies a forecast that the year will set new post-depression records in both sales and production, according to Samuel B. Robertson, president of the B. F. Goodrich Company, Akron.

"I see no reason at present to change the prediction made at the first of the year that tire sales as a whole will reach 54,000,000 units for 1937," Mr. Robertson stated, and added that "if unforeseen factors do not change the situation this figure may even be surpassed." On the basis of figures for the entire industry shipments are about 600,000 units greater per month for the first half of the current year than for the same period of 1936, he pointed out. Shipments of tires for the first five months of 1937 amounted to 24,316,000 units, as compared with 21,169,000 units in the similar period of last year.

According to Mr. Robertson, the average American motorist's tire bill this year will be $15.00, as compared with $200.00 two decades ago. The average truck and bus tire bill has been reduced from $600.00 to $65.00 in the same period.

TIRE SHIPMENTS DROP IN APRIL-MAY PERIOD

Shipments of pneumatic casings during the month of April, estimated at 5,560,453 units, showed a decrease of 3.9% under March but were 13.4% above April, 1936, while shipments during May, estimated at 5,374,654 units, showed a 3.3% decrease under April and were 7.9% below shipments made in May, 1936, according to statistics released by the Rubber Manufacturers Association.

Production of pneumatic casings for April is estimated at 5,729,869 casings, a decrease of 3.1% under March and 18% above April, 1936. Production for May is estimated at 5,351,638 casings, a decrease of 6.6% under April but 7.6% above the same month of the preceding year.

Pneumatic casings in the hands of manufacturers on April 30 were estimated at 12,628,872 units, an increase of 1.5% over stocks on hand at the end of the previous month and 39.8% above stocks on hand on April 30, 1937, while inventory at the end of May was estimated at 12,592,215 units, a decrease of less than 1% under stocks on hand at the end of April, 1937, and 54% above the inventory of May 31, 1936.

The actual figures are as follows:

PNEUMATIC CASINGS

		Shipments	*Production*	*Inventory*
Apr.	1937	5,560,453	5,729,869	12,628,872
May,	1937	5,374,654	5,351,638	12,592,215
Apr.,	1936	4,904,116	4,857,083	9,034,707
May,	1936	5,833,333	4,974,119	8,177,800

LATEX BIBLIOGRAPHY NEARING COMPLETION

The second edition of the latex bibliography compiled by Frederick Marchionna, covering the period from June, 1932, to January, 1937, is nearing completion. This new edition has been expanded to include rubber derivatives and will be published in two volumes under the name of "LATEX AND RUBBER DERIVATIVES—AND THEIR INDUSTRIAL APPLICATIONS." It will sell for $20.00 for both volumes. It is now definite that the book will approximate 1600 pages and will be ready for distribution within the next sixty days. Advance orders are being accepted by THE RUBBER AGE, 250 West 57th Street, New York City, exclusive sales agents for both the first and second editions.

Practically every chapter in both volumes of the new edition will have an introduction summing up the progress recorded in the various branches of the industry covered by the bibliography. Prominent chemists who have contributed articles include John McGavack, P. Schidrowitz, C. L. Beal, D. F. Twiss, George A. Richter and M. O. Schur, A. Szegvari, Harry L. Fisher, L. B. Sebrell and E. J. Morris, and others. G. Bruni, noted Pirelli technologist, will again write a general introduction for the book.

The new edition will consist of twenty-two chapters, seventeen devoted to latex and five to rubber derivatives, in addition to author, patentee, patent and subject indexes. A complete list of the chapter heads follows: Latex and Its Properties; Conditioning of Latex; Vulcanized Latex and Vulcanization Process; Compounding and Compounded Latex: Depositing Latex Processes and Dipped Articles; Rubber Threads and Filaments Manufacture; Textile Fabric Manufacture; Paper and Artificial Leather Manufacture; Coating and Impregnation—General; Electrical Insulation; Porous Rubber Products; Floor and Road Coverings; Shoe Manufacture; Rubber Powders; and Miscellaneous Processes and Products.

Artificial Latex and Mixed Dispersions; Electrodeposition of Rubber; Oxidized Rubber; Hydrogenated Rubber; Halogenated Rubber Products; Cyclized Rubber; and Condensation Products of Rubber. Following the introduction in each chapter there appears a list of the patents pertaining to the particular subject involved, followed by a list of references to the technical literature.

JUNE CONSUMPTION SHOWS GAIN OVER MAY

Consumption of crude rubber by manufacturers in the United States during the month of June is estimated to be 51,798 long tons, which compares with 51,733 long tons during May. June consumption shows an increase of less than 1% over May but is 1.8% under June a year ago, according to statistics released by the Rubber Manufacturers Association. Consumption for June, 1936, was 52,772 (revised) long tons.

Gross imports of crude rubber for June are reported to be 48,956 long tons, a decrease of 3.7% under the May figure of 50,840 long tons but 17% over the 41,835 long tons imported in June, 1936.

Total domestic stocks of crude rubber on hand on June 30, are estimated at 169,646 long tons, which compares with May 31 stocks of 172,985 long tons and 245,544 (revised) long tons on hand June 30, 1936.

Crude rubber afloat to United States ports as of June 30 is estimated to be 57,215 long tons, which compares with 58,542 long tons afloat on May 31 and 47,228 long tons afloat on June 30 a year ago.

June reclaimed rubber consumption is estimated at 14,414 long tons; production, 16,052 long tons; and stocks on hand on June 30, at 14,535 long tons.

Boston Holds Outing

The Boston Group, Rubber Division, A.C.S., was scheduled to hold the first of a series of annual outings, similar to those held by other groups, at "Fieldston" in Marshfield, Mass., on August 13. An active day was planned for the participants, including golf, swimming, tennis and other sports. Features for the day comprised a baseball game between teams representing the Boston Group and the Rhode Island Rubber Club, an exhibition of fancy and trick shooting by W. G. Hill of the Remington Arms Company, and entertainment. A complete report of the outing will appear in the next issue of this journal.

Announce Slogan Rules

The management of the 16th Exposition of Chemical Industries, which will be held at Grand Central Palace, New York City, December 6 to 11, 1937, has announced the rules governing its contest the object of which is to select a descriptive slogan for the chemical and chemical process industries "encompassing their aims and suggesting their manifold benefits." Eleven prizes will be awarded, $250.00 for the winning slogan, and ten prizes of $5.00 each for the next best slogans submitted. Further details can be secured from the Exposition of Chemical Industries, Grand Central Palace, New York City.

IMPORTANCE OF TIRES DECLINING IN TRADE

Although the manufacture of tires and tubes still represents more than half the value of the rubber industry's total production, the major factor in the current recovery being experienced by the trade is the increased production and sale of rubber goods other than these products, according to a recent issue of *The Index,* issued by the New York Trust Company. The importance of tires and tubes from a statistical angle is progressively declining, according to the bank review, as new fields of usefulness are opened up for the so-called mechanical goods primarily employed by machinery and industrial equipment manufacturers.

Future prospects appear to point toward even more reliance by manufacturers of miscellaneous products, continues the report. Original equipment sales of tires and tubes are geared directly to the manufacture of automobiles and while they may be expected to expand still further with increased production of motor vehicles this type of business has always had a very narrow profit margin. Replacement sales, on the other hand, are limited in their possible expansion because of the longer life which tire manufacturers have succeeded in giving their products.

No such definite limits exist to the potentialities opening up through the new uses of rubber, the report concludes. Equipment of tractors with newly-developed tires suitable for farm machinery and rubber for automobile upholstery constitute two fields of expansion which may prove as important as the original automobile tire business itself. With research and product improvement continuing, the opportunities of manufacturers of rubber products appear distinctly encouraging.

1936 CREDIT STATUS REPORTED BY STORES

Customers of automobile tire and accessory stores made a larger proportion of their purchases on a credit basis in 1936 than compared with 1935 but paid for them more promptly, according to a survey recently completed by the Bureau of Foreign and Domestic Commerce, Washington, D. C. The statistics also show that the ratio of bad-debt losses to open-credit sales was lower in 1936 than in 1935.

According to the 121 automobile tire and accessory stores reporting sales data in the survey, merchandise bought on the installment plan accounted for 14.3% of total sales in 1936 as compared with 11.7% in the preceding year. Cash sales accounted for a lesser proportion of total sales in 1936 than in 1935, the figures being 55.2% as compared with 59.2%, while the proportions of regular charge business increased slightly, averaging 30.5% in 1936 and 29.1% in 1935. The total sales of the stores reporting in the survey increased 15.7% in the period.

Collection percentages on open-credit accounts receivable were somewhat higher in 1936 than in 1935, 59.8% as compared with 58.2%, respectively. The classification of stores by annual volume of business indicates that stores falling in all size groups except the group with sales between $50,000 and $100,000 were successful in increasing their collection ratio during 1936.

The collection percentages on installment accounts for 53 of the stores reporting increased to 35.9% in 1936 from 32.4% in the previous year. The ratio of bad-debt losses on open-credit sales was slightly lower in 1936 for 67 of the stores reporting than in 1935, being 0.8 of 1% and 0.9 of 1%, respectively. The average loss from bad debts on installment-credit sales for 56 stores reporting was slightly higher in 1936 than in 1935, 1.4% as compared with 1.3%, respectively.

Appoint New Representative

Calo and Lydon, 90 West Street, New York City, have been appointed sales representatives for the Neville Company, producers of coal-tar products, in the metropolitan New York district. The Neville concern has recently introduced several new coal-tar products for use by the rubber industry.

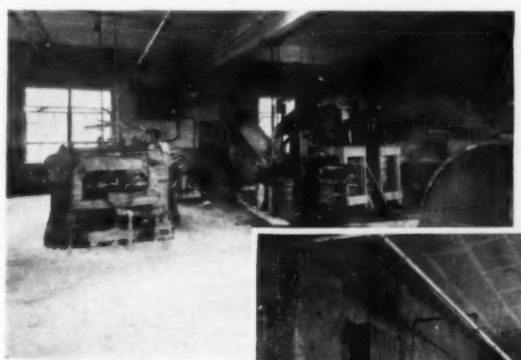
Liquidating Phillips-Baker

The Phillips-Baker Rubber Company, Providence, Rhode Island, is being liquidated "because of C. I. O. labor difficulties," according to one executive. The entire plant of the company, including real estate, machinery and equipment, has been offered as a complete unit by the Henry W. Cooke Company, 615 Hospital Trust Building, Providence, and Samuel T. Freeman & Co., 80 Federal St., Boston. The plant, modern in most respects, was devoted to the manufacture of rubber and rubber-soled canvas footwear, and had a production capacity of several million pairs annually. The complete unit will be offered at a public auction to be held on the premises on Friday, August 20.

Seeks Crude Rubber Agency

M. A. Frascara, Avenida de Mayo No. 1035, Buenos Aires, Argentina, is interested in contacting crude rubber producers or dealers with the idea of representing them in the Argentine. He prefers to act as selling agent for some American firm. Mr. Frascara is the Buenos Aires agent for David Bridge and Company, Ltd., manufacturers of rubber mills and equipment of London, England.

VIEWS OF VANSUL'S FACTORY AT ENGLEWOOD



Left: An interior view of the Vansul plant at Englewood, N. J., showing the color masterbatch unit, including coupling tanks, colloid mills, dryer, sheeting mill, etc.

Right: A view of the extensive laboratory maintained by Vansul in its Englewood, N. J., plant. A laboratory mill is seen at the right foreground.

Vansul, Inc., engaged in the development and selection of colors, pigments and fillers for rubber manufacturers for the past eleven years, operates a modern and well-equipped laboratory and factory at 193 William Street in Englewood, New Jersey, pictures of which are reproduced above. The company, which maintains its sales office at 112 Broad Street in New York City, specializes in masterbatches for Banbury and general milling, printing pastes for rubber printing, dry forms for special purposes, and other color forms. Distributors are in Boston, Los Angeles and Akron, as well as in Montreal and Toronto, Canada, and Mexico City. J. DeC. Van Etten and Theodore Sullivan are the Vansul executives. A competent sales and factory staff is maintained.

LOS ANGELES NEWS

Carl E. Stentz, secretary and treasurer of the Los Angeles Group, Rubber Division, A.C.S., resigned his position with the E. M. Smith Company, Los Angeles, effective August 1, and has accepted a position as technical advisor of the Darnell Corporation, Long Beach, and also as secretary and treasurer of the Arrowhead Rubber Company. This last named concern is a new rubber manufacturing company, recently organized, and occupies its own building at 1976 Laura Street, Huntington Park (Los Angeles suburb). The new factory has 14 presses, one sponge rubber press, a mill and other machinery necessary to turning out a regular line of mechanical rubber goods. Ray Cowles, formerly with the Baldwin Rubber Company at Pontiac, Michigan, is foreman. Six men are employed in the mechanical department at present. Mr. Stentz had been connected with the E. M. Smith Company for some years. The Darnell Corporation is interested mainly in the manufacture of casters and rubber wheels.

A night fire originating from spontaneous combustion on Friday, July 24, practically gutted the interior of the Kirkhill Rubber Company's main plant at Slauson and Hoover Boulevards. The offices, which were in the same building, were also badly damaged, although none of the books or records were destroyed.

Fortunately none of the machinery was damaged, the fire being more of a wall and roof conflagration. A crew of men were able to get wheels turning again within three days. The scorched plant was operating at 50 per cent capacity on Monday, and 100 per cent capacity on the following Thursday. Tentative plans call for a new fireproof structure. In the meantime, executive offices have been moved across the street into the warehouse. According to Leslie W. Winship, associate of T. Kirk Hill in the company, the total fire loss is about $12,000, including $2,200 worth of stock, the total being covered by insurance.

The Goodyear Tire and Rubber Company, the C.I.O., the United Rubber Workers of America, and the Goodyear Employees' Association, on July 28 agreed to the holding of an election at the plant to determine which of the two unions should be the collective bargaining agent for the 1,500 production workers at the plant.

The Faulhaber Rubber Company, 1346 East Slauson Avenue, has completed a warehouse 46 by 80 feet, and has added several new presses and mills. The factory crew has been greatly enlarged, a double shift going on duty August 1. Eight new salesmen have recently been put on the road. The company specializes in rubber tile floor covering but also branches out into other products to some extent. Karl W. Faulhaber is president and general manager.

Sam Stein, president of the Santa Fe Rubber Mills at 609 Santa Fe Avenue, accompanied by his wife, left for Europe on July 1. Time will be spent in England, France and other countries. They will return to Los Angeles about September 15. Increased demand for the company's products, camelback being the principal item, has caused the employment of three shifts recently, the plant running 24 hours daily.

Ed. Royal, in charge of preparations for the annual fishing trip of the Los Angeles Rubber Group, A.C.S., reported practically a full slate of registrations for the trip in his hands on August 1. The chartered launch was to pull out of San Diego harbor on the morning of Sunday, August 8, and return to dock in the middle of the afternoon. The rubber men in most instances planned to take their families with them for a vacation outing at San Diego.

Frank Dalton, president of the D. & M. Machine Works, Torrance, California, has sailed from Los Angeles on his 110-foot twin-diesel boat for a vacation trip to Alaska. He took along 4,000 feet of colored film which will be shown to members of the Los Angeles Rubber Group at a meeting in the Fall. Mr. Dalton's boat is equipped with a radio telephone and may be contacted from shore points at any time. Prior to his departure, the boat was equipped with a public address system, automatic steering device, and other conveniences. According to N. E. Shawger, superintendent of the rubber department of the D. & M. Machine Works, both the rubber division and the machine shop are operating on a 16-hour day, 6 days per week. Principal rubber products now being manufactured include garden hose and oil well pistons.

Addition of a new 250 h.p. motor, two new sixty-inch mills and modernization improvements in the mixer, have increased the capacity and facility of the West American Rubber Company, Inc., greatly, according to Charles Lamb, in charge of production at the plant. Further improvements and enlargements are under consideration for a later date, Mr. Lamb states.

Issue Lubrication Booklets

Because of the volume of requests for non-technical information in regard to the manufacture and application of lubricants, the Shell Petroleum Corporation, St. Louis, Missouri, is currently issuing a series of booklets devoted to this subject, under the general head of the "Panorama of Lubrication." The first three booklets issued to date are devoted to the fundamentals of lubrication, lubricating friction type bearings and Golden Shell, respectively. The series is dedicated to executives, engineers, salesmen and students.

TRENTON NEWS

Improvement is reported in the condition of Browning Morean, president of the Whitehead Brothers Rubber Company, Trenton, who has been ill for several weeks at his home in New York City.

Declaring that there is no further need of an organization, the Trenton Tire Dealers' Association, of Trenton, N. J., has disbanded. The association was organized about a year ago and was made up of a majority of tire dealers. With the recent adjustment of prices officials claim that there is no further need of an organization.

The Lambertville Rubber Company, Lambertville, has placed a number of extra hands at work in the production of summer footwear. The concern is operating under a trustee, John T. Crowley, who is also president of the company.

Puritan Rubber Company, Trenton, has let a contract for a one-story factory addition. The company is operating at only fifty per cent capacity while new hydraulic machinery is being installed. As a result, some of the employees have been laid off temporarily.

The New Jersey State Tax Appeal Board has reduced the assessment of the Murray Rubber Realty Holding Corporation, Trenton, from $231,000 to $88,900.

The Crescent Employees' Association, Inc., composed of employees of the Crescent Insulated Wire & Cable Company, Trenton, has been incorporated to "safeguard the interests of the employees under rights given to labor by the National Labor Relations Act."

Names in the News

CHESTER T. MORLEDGE, formerly vice-president in charge of sales for the India Tire Company, has been named assistant manager, automobile tire department, B. F. Goodrich Company, Akron. His first connection with the rubber industry was with the American Rubber and Tire Company in 1920.

DAVID KUBIE, president, Raw Products Company, New York City, discussed rubber trading on July 20 in the first of a series of talks on commodities arranged by Maloney, Anderson and Block, New York commodity firm. He expressed the belief that the large tire manufacturers are now using the rubber futures market for hedging purposes far more than heretofore.

H. P. HEAVISIDE, formerly credit manager in the western sales territory for the New Jersey Zinc Sales Company, has been appointed general credit manager for the New Jersey Zinc Company and its subsidiaries, with headquarters at New York City.

ROBERT T. BROWN, development engineer, Goodyear Tire and Rubber Company, Akron, attended the International Standardization Conference, held in London, England, last month. He is the American delegate of the Tire and Rim Association.

FREDERICK J. MAYWALD, JR., who was associated with his late father for the past eight years, will carry on the consulting business at Carlstadt, New Jersey. The late Mr. MAYWALD was successor to the late DR. PETER T. AUSTEN.

KENNETH E. MOORE, associated with the sales promotion department of the Johns-Manville Corporation for the past ten years, has resigned to become assistant advertising manager of the Flintkote Company, East Rutherford, N. J.

H. E. VAN PETTEN, advertising manager, mechanical division, B. F. Goodrich Company, Akron, has been elected president of the Industrial Marketers of Cleveland.

R. J. HAWN, a director of manufacture with several Monsanto plants under his supervision, was elected vice-president of the Monsanto Chemical Company, St. Louis, Mo., on July 22. He had been a vice-president of the Swann Chemical Company prior to its absorption by Monsanto in 1935.

BRADLEY DEWEY, president, Dewey and Almy Chemical Company, has been elected a life member of the governing board of the Massachusetts Institute of Technology, Cambridge, Mass. He is a graduate of the class of 1909.

Changes at Goodyear

Several shifts in its executive personnel were announced by the Goodyear Tire and Rubber Company last month. H. K. Hough, managing director of the British subsidiary at Wolverhampton, England, becomes advertising manager of the parent concern and all subsidiaries on October 1, while W. A. Hazlett, sales manager of the western division, was named managing director at Wolverhampton. L. E. Judd, director of the public relations and advertising departments, will hereafter devote his time exclusively to public relations, and H. G. Harper relinquishes his advertising post to become western division manager with headquarters at Los Angeles. J. E. Mayle, assistant sales manager at Akron, has been elevated to vice-president of California Goodyear, while Harry E. Blythe, also an assistant sales manager, was named sales manager of the tire division in charge of wholesale and retail tire sales. It was also announced that C. C. Osmun would act as division manager of the southeastern territory.

Hay Visits America

Alexander Hay, Agricultural Liaison Officer of the Rubber Growers Association, of London, England, has been spending the past few weeks in the United States studying the application of rubber to farm vehicles, including motor-driven and horse-drawn vehicles. Mr. Hay, who was accompanied by his wife, arrived in Montreal on May 8 and spent the next several weeks visiting rubber and agricultural centers in Ottawa, Toronto, Guelph, Kitchener, Hamilton, and other Canadian provinces. Early in July he entered the United States via Seattle and then came on to New York, making stops at St. Paul, Madison (Wisc.), Akron and Washington. In an interview with a representative of this journal Mr. Hay stated that American agriculturists have taken to rubber more than any other country in the world, with Canada a close second. He was scheduled to return to England about August 10.

PHILIP J. KELLY, formerly director of advertising and assistant sales manager of the B. F. Goodrich Company, Akron, and more recently associated with Fuller and Smith & Ross, Cleveland advertising agency, has been named sales promotion manager of Palmolive Soap for the Colgate-Palmolive-Peet Company.

P. W. LITCHFIELD, president, Goodyear Tire and Rubber Company, Akron, celebrated his 62nd birthday on July 26. He spent the day at the factory, as usual.

Celebrates Golden Jubilee

W. J. Scott

W. J. Scott, head of the mechanical goods division of Gutta Percha and Rubber, Ltd., Toronto, Canada, celebrated his golden jubilee with that company on August 6. Only twelve years of age and just three weeks out of England, Mr. Scott joined Gutta Percha in 1887, the year of Queen Victoria's Golden Jubilee. Although the position was intended to be a temporary one as office boy, it developed into a lifetime association. Gutta Percha had only been in existence for four years when Mr. Scott joined the company. Today it is recognized as the largest all-Canadian rubber company.

Hummel Heads Eagle-Picher

Several important changes have been made in the personnel of the Eagle-Picher Lead Company, Cincinnati, Ohio, including the election of Joseph T. Hummel, Jr., formerly secretary-treasurer of the company, to succeed A. E. Bendelari as president. Although resigning from the presidential post, Mr. Bendelari continues as a member of the board of directors and the executive committee. William R. Dice has been elected executive vice-president and Vincent H. Beckman becomes secretary. It has also been announced that an inter-company decentralization plan has been adopted whereby each of the three main divisions of the company will be operated as independent units. In connection with this program, Miles M. Zoller has assumed control of the Pigment and Oxide Division, the products of which go into the manufacture of rubber and other materials. Mr. Zoller has been with Eagle-Picher since being graduated from the Massachusetts Institute of Technology in 1921.

J. C. CLINEFELTER, of Akron, has been appointed sales representative for the Black Rock Manufacturing Company, Bridgeport, Conn., manufacturers of rubber cutting machinery, to cover the Akron territory, Northern Ohio and Western Pennsylvania. He also represents John Royle & Sons of Paterson, N. J.

Financial News

U. S. RUBBER CO. DOUBLES ITS INCOME

The United States Rubber Company reports net income of $4,500,609, after all charges but before provision for the surtax on undistributed profits, for the first six months of 1937. This compares with net income of $2,187,902 reported for the corresponding period last year. The current profit is equal to $1.29 a share on the common stock, after preferred dividends. The report shows a total of approximately $7,000,000 set aside for the payment of excise, sales, social security, property, capital stock, franchise, stamp and income taxes.

Sales for the six-month period amounted to $94,775,938, an increase of 33% over the sales of $71,400,634 for the 1936 period. Because of the continued uncertainty in the market prices of crude rubber and cotton, an additional reserve of $1,000,000 was created from current earnings. The total reserve for this purpose is now set at $3,000,000.

Due to a change in accounting procedure (which became effective on January 1, 1937) earnings for the six-month period have been calculated on the basis of actual cost of inventories. Previously, semi-annual earnings were calculated on the basis of predetermined cost of inventories. The report also discloses that the 6% bonds of the Dominion Rubber Co., Ltd., a subsidiary, due in 1946, are being called for payment on October 1, 1937.

U. S. Rubber Plantations, Inc., earned an approximate profit of $2,500,000 for the first six months of the current year, after provisions for depreciation and amortization of $950,000 and all other charges, according to the report. This profit was not included in the six-month earnings of the parent concern.

GOODYEAR REPORTS PROFIT OF $8,068,352

Consolidated net earnings of the Goodyear Tire and Rubber Company and subsidiaries for the six months ended June 30, 1937, after taxes, depreciation, and interest, but without allowance for surtax on undistributed profits, amounted to $8,068,352, after deduction of a special reserve of $1,500,000 to meet fluctuations in prices of raw materials and other contingencies, and after inventory and forward commitments had been written down to the lower of cost or market. These earnings compare with $3,598,683 for the corresponding period in 1936. Consolidated net sales during the first six months of 1937 increased to $116,475,700 as compared with $90,908,684 during the same period in 1936, a gain of 28%.

The Board of Directors on August 9 declared the regular dividend of $1.25 per share on the company's $5 convertible preferred stock, which will be payable on September 15 to holders of record August 19. At the same time, a dividend of 50 cents per share, payable on September 15 to holders of record August 19, was declared on the common stock.

The consolidated balance sheet as of June 30, 1937, showed current assets of $120,594,368, including cash on hand of $11,976,812. Current liabilities amounted to $13,486,965. Net working capital was $107,107,403, an increase of $1,443,221 since December 31, 1936. Inventories of raw materials and finished products, which totaled $76,844,465, on June 30, 1937, and forward commitments were carried at cost or market, whichever was lower.

During the six-month period covered by the current financial report all shares of the company's $7 second preferred stock that remained outstanding upon completion of the plan of rearrangement of capitalization were called for redemption at $110 per share and accrued dividends.

A memorandum to stockholders accompanying the financial report, and signed by P. W. Litchfield, president, reveals that more than two-thirds of Goodyear's total receipts for the first six months of 1937 were paid to personnel directly employed by the company and for materials purchased by it. Goodyear employs in excess of 53,000 persons in America and abroad, and payments to these workers for the six-month period amounted to $88,956,389.

The memorandum also reveals that Goodyear paid $8,299,719 in taxes, $3,206,253 for transportation services, $4,345,539 in dividends to 43,000 stockholders, and that $3,942,938 went to reserve accounts to cover depreciation on plants, equipment and other property.

Martin Custom Made Tires

Six months to June 30: Profit of $36,514, before depreciation and taxes were deducted, which compares with $24,108 profit in the similar quarter of 1936. Gross sales for the 1937 period amounted to $474,101, an increase of 40% over the $338,408 sales reported in the same period last year.

Pharis Tire and Rubber

Six months ended June 30: Net profit of $23,673, after provision for the surtax on undistributed profits, equal to 10 cents a share on 220,000 shares of common stock. This compares with net income of $59,413, or 27 cents a share, in the first six months of 1936.

GENERAL REPORTS PROFIT OF $991,262

The General Tire and Rubber Company, Akron, Ohio, reports a net profit of $991,262, after provision for Federal income tax but before making any allowance for excess profits tax and surtax on undistributed profits, for the six-month period ended May 31, 1937. Net sales for the period totalled $10,212,794. After deducting preferred dividends of $81,375, the profit is equal to $2.01 per share of common stock on the basis of 452,875 shares outstanding on May 31. Since that date, 64,697 additional common shares have been sold to stockholders.

This is the first time that General Tire has made a semi-annual earnings statement. These periodical statements, however, will continue to be made to stockholders in the future in accordance with an agreement made by the company with the New York Stock Exchange at the time the Exchange accepted General's new stock for listing. Although no figures were made available for the corresponding six-month period of last year, President William O'Neil said that the profit was comparatively considerably higher. During the entire fiscal year of 1936, sales totalled $17,909,886, net profits for the twelve-month period being equal to $2.53 per common share.

On July 31, General preferred stockholders received $7.50 a share in payment of all deferred preferred dividends to date. The deferred dividends were paid to stockholders of record on July 20. They had accumulated during the period from June 30, 1932, to September 30, 1933, since which date regular preferred dividends have been paid.

Firestone to Redeem Bonds

Announcement has been made that the Firestone Tire and Rubber Company of California will redeem its 15-year sinking fund 5% gold bonds, due September 1, 1942, on September 1, 1937. The bonds, which will be redeemed at their principal amount plus accrued interest plus a premium of 1½% of the principal amount, are dated September 1, 1927. Bondholders are to present their holdings at the principal offices of the Cleveland Trust Company at Cleveland, or the National City Bank of New York City. In all, $750,000 in bonds are to be redeemed.

Baldwin Rubber Co.

Six months to June 30: Net profit amounts to $335,666, equal to $1.20 each on 278,604 shares of $1-par common stock, as compared to a profit of $245,064, or 88 cents a share, a year ago. Net profit for the June quarter was $159,616, or 57 cents a share, against $176,050, or 63 cents a share, in the preceding quarter, and $123,978, or 44 cents a share, in the corresponding quarter of 1936.

BROWN RUBBER CO. OFFERS NEW SHARES

Public offering of 140,000 shares of $1.00-par value common stock of the Brown Rubber Company, Lafayette, Indiana, was made by means of a prospectus issued by James J. Boyland of New York City on July 20. They were offered at $5.25 per share. The offering constituted 40,000 new shares, the balance being sold for certain stockholders, according to the prospectus. Proceeds are to be used to retire all promissory notes issued in payment of dividends and also for working capital.

Brown Rubber Company was organized in 1925 and manufactures molded rubber parts, especially for the automotive, refrigerator and air-conditioning industries. For the first five months of the current year it reported net income of $90,483, after all normal taxes were deducted but before provision for any surtax on undivided profits. This compares with net profit of $141,091 for the full year of 1936 and $51,572 for the full preceding year. Earnings on the basis of 200,000 shares in 1936 were equivalent to 70 cents, against 26 cents per share in 1935.

Authorized capitalization of the company, which is reported to have no funded debt or preferred stock, consists of 300,000 shares of $1.00 par value common stock, of which 200,000 are to be outstanding.

Hewitt Rubber Corp.

Six months to June 30: Net income reported at $200,017, equal to $1.19 each on 168,188 shares of $5-par common stock, which compares with $129,134, or 77 cents a share on the present capitalization in the corresponding quarter of last year.

General Cable Corp.

June quarter: Net profit of $1,068,924, after provision for surtax, which compares with a revised net profit of $409,528 for the June quarter of 1936. Net profit for the twelve months ended June 30, 1937, amounted to $2,989,785.

India Plant Still Closed

The factory of the former India Tire Company at Mogadore, Ohio, continues to be kept closed because of the unsettled labor conditions in Akron, according to an official of L. Albert and Sons, dealers in second hand rubber machinery, who purchased the plant at public auction several months ago. If not for the labor situation a large oil company would take over the plant and commence operations, according to the same official. Labor troubles, which resulted in a closed shop, were partially blamed for India's forced liquidation late last year.

Coming Events

Sept. 9-10. Rubber Division A.C.S., Powers Hotel, Rochester, N. Y.
Oct. 11-15. National Safety Council. (26th Safety Congress). Kansas City, Mo.
Oct. 18-20. National Association of Independent Tire Dealers, Hotel Stevens, Chicago, Ill.
Oct. 22-23. Ninth Annual Meeting of the Society of Rheology, Hotel Mayflower, Akron, Ohio.
Dec. 5-11. Exposition of Chemical Industries Grand Central Palace, New York City.
May, 1938. International Rubber Congress, London, England.

Change Stein-Brill Name

The Stein-Brill Corporation, 183 Varick Street, New York City, has announced a change in corporate name to the Brill Equipment Corporation. No change in management is involved. The company, which deals in used rubber and other machinery, has recently opened a new office and warehouse in the Mart Building, St. Louis, Missouri. This branch will also act as a representative for several nationally-known machinery manufacturers.

Firestone Latex Cushion

Featuring a surface said to be fireproof and impervious to accidental ignition of any kind, the Firestone Tire and Rubber Company, Akron, has developed a new type of cushion for use

in the transportation industry, which it has termed the Firestone Latex Whip Sponge Rubber Cushion. The new cushion is described as having unusual buoyancy and softness and may be used in seat backs, head rests, mattresses, and other forms of upholstery. It is contructed of innumerable tiny interconnected air cells and "breathes" easily. This "breathing" action, due to the porousness of the material, improves the comfort of the cushion in hot weather and also has a sanitary effect.

CONSUMPTION SETS SIX-MONTH RECORD

Crude rubber consumption in the United States for the first six months of the current year totalled 312,097 long tons, according to figures compiled by the Rubber Manufacturers Association. This is the first time that any six months' total has exceeded the 300,000-ton mark, and represents an increase of 28,397 tons, or 10%, over consumption in the first half of 1936.

During the same period, 89,344 tons of reclaimed rubber were consumed, which compared with 63,592 tons in the corresponding six months of last year. This represents an increase of 25,752 tons, or 40.5%. During the first half of 1936 the consumption of reclaimed was 22.4% to that of crude rubber, this percentage increasing to 28.6% for the 1937 period.

Crude rubber stocks on hand at the end of June, 1937, were approximately 75,000 tons under those at the end of June a year ago, the figures being 169,646 tons against 245,544 tons. Stocks available in the United States have shown a steady monthly drop since June, 1936, with the exception of one month when they showed a slight increase over the end of the preceding month.

Approve Rubber Safety Code

A safety code for rubber mills and calenders (B28a—1927) has been officially approved by the American Standards Association. Mills driven in groups, and individually and group-driven calenders are covered by this code which contains operating rules together with a discussion of accident prevention in connection with these operations. Copies of the code may be secured for 5 cents each by writing the American Standards Association, 29 West 39 Street, New York City.

New U. S. Safety Tube

A new U. S. Royal Master safety tube, featuring a laminated 3-ply base which is said to overcome tube failures due to pinching, abrasion, rust and corrosion, has been announced by the U. S. Tire Dealers Mutual Corporation, New York City. The new laminated construction gives extra protection at the rim side, extending over to that part of the tube which comes into contact with the steel rim, and on up the walls beyond the toes of the beads, according to the company.

Acticarbone Corp. Moves

After August 15, the Acticarbone Corporation, manufacturers of solvent recovery apparatus, will be located in the Lincoln Building 49 East 41st Street, New York City. The move was said to be necessitated by the need for larger quarters due to a larger staff attributed to increased business.

OBITUARIES

Joseph W. Thropp

Joseph Wilkes Thropp, secretary-treasurer of the William R. Thropp and Sons Company, rubber machinery manufacturers of Trenton, New Jersey, died at the age of 51 at Mercer Hospital, Trenton, on July 28, following a lengthy illness. He had been in poor health for more than a year and suffered a stroke at his Summer home at Normandy Beach, N. J., before being brought to the hospital. Mr. Thropp was born on July 7, 1886, and was a resident of Trenton all his life. He attended the State Model School and was graduated from Drexel Institue in 1906 after which he joined the Thropp firm. He included the National Safety Council, American Automobile Association, Trenton Rotary Club and the Carteret Club among his memberships, and was a Mason. He was also a member of the Bristol Bay Head Yacht Club, his hobbies including sailing and fishing. Mr. Thropp is survived by his widow, mother, son, brother and sister. Burial was in Greenwood Cemetery, Trenton.

Walter I. Satow

Walter I. Satow, general foreman, Goodyear Tire and Rubber Company, Akron, died in a Battle Creek (Michigan) sanatorium, on July 3, at the age of 59. Mr. Satow had been in ill health for the past year and had recently returned from an extended stay in Florida. He was at the Battle Creek sanatorium for only a few days prior to his death. Mr. Satow started in the mechanical goods division of Goodyear in 1913 and shortly thereafter was appointed a division superintendent. In 1915 he was named assistant general foreman and a few years later became general foreman. Before coming to Goodyear he was associated with the Portage Rubber Company of Barberton. Mr. Satow leaves a widow and a son.

Charles B. Wilson

Charles B. Wilson, chairman of the board of directors and treasurer of the Baldwin Rubber Company, Pontiac, Michigan, and also chairman of the board of the Wilson Foundry and Machine Company of Pontiac, died at his home in Bloomfield Hills, Michigan, on July 23, after a long illness. He was 65 years of age. A pioneer of the automotive industry, Mr. Wilson served as superintendent of the Olds Motor Works many years ago, and later became vice-president and general manager of the Willys-Overland Company. During the World War he acted as manager of the Curtiss Airplane Corporation's plants in the United States and Canada.

Herman B. Post

Herman B. Post, manager, merchandise department, export division, Goodyear Tire and Rubber Company, Akron, died on July 1, while vacationing at Asheville, North Carolina. He appeared to be in good health when he left Akron, although he had been suffering from asthma for many years. Mr. Post was born in Salt Lake City, Utah, and was graduated from the University of Utah. He came to Akron in 1918 and the following year joined Goodyear. After serving in various posts he was named head of the mechanical goods division where he remained until 1927 when he joined the export division of the company. In 1928 he made a survey of European conditions for Goodyear. Mr. Post leaves a widow, father, two sons and a brother.

E. F. Parker

E. F. Parker, Chicago district manager of the General Tire and Rubber Company, Akron, died from a heart attack at his Chicago home on July 6 shortly after returning from a holiday week-end in Akron. Mr. Parker took over the Chicago territory last year, after serving for four years in the Akron office in charge of the Minneapolis, Kansas City and Dallas districts. Before joining General, he served with Firestone for approximately sixteen years. He leaves a widow and three daughters.

Tapping Nears Completion

Shipments of crude rubber from the Liberian plantations maintained by the Firestone Tire and Rubber Company, Akron, are expected to increase sharply in the near future, according to report. It is known that the trees on approximately 15,000 acres have already matured, but trees on an additional 85,000 acres are said to be nearing maturity and tapping operations are planned. Based on these figures, shipments are expected to increase six-fold. There are two Firestone plantations in Liberia, the largest being about 40 miles inland from Monrovia, and the other located on the French border near Cape Palmas. Both plantations employ approximately 40,000.

Organize Paeco Rubber Co.

The Paeco Rubber Company has been incorporated for $25,000, and was expected to start operations in a factory located at North Walnut and East Highland Avenues, in Ravenna, Ohio, recently. Incorporators included Dr. J. S. Deyell, Dr. T. G. Gregory and L. S. Havre, all of Ravenna. The new company will manufacture rubber nipples and finger cots, among other items.

To Renovate McClaren Plant

The plant of the McClaren Rubber Company in Charlotte, North Carolina, which has been used as a distributing point for Dayton rubber products since the Dayton Rubber Manufacturing Company of Dayton, Ohio, took over McClaren, will be renovated and improved preparatory to the resumption of rubber manufacturing activities, according to Irving Eisbrouch, president of Dayton Rubber. New machinery and equipment will be added, according to present plans.

Premier Rubber Expands

The Premier Rubber Manufacturing Company, Dayton, Ohio, is building a second story over its present office, laboratory and plating department, which will add approximately 7,000 square feet of floor space to the factory. After completion of the addition, the office and laboratory will be moved to the second floor and the vacated space on the first floor devoted to manufacturing.

NEW ENGLAND

General Electric Company, Bridgeport, has increased its facilities for the manufacture of rubber-covered wire, cable and cord by more than 50 per cent. The expansion program, completed on August 1, has resulted in employment of 300 more workers, according to W. Stewart Clark, works manager.

R. C. Wilmot has been appointed managing engineer for wiring materials, with responsibility for both engineering and manufacturing of rigid conduit, wiring devices and accessory equipment, and wire, cable and conduit products in the Bridgeport plant.

H. H. Watson is now designing engineer for wiring devices, and C. H. Baker has been named supervisor of production with responsibility for coordinating production activities at Bridgeport and branch works.

Connecticut Hard Rubber Company, New Haven, has purchased 200 common shares of its own stock at $100 each, and its affiliate in the same plant, Marvel Co., has bought in 50 common shares of Marvel stock at the same price. The companies make a variety of rubber goods, including hot water bottles.

Whitney-Blake Company, Hamden, Conn., manufacturer of rubber insulated wire and cable, is anticipating a 100 per cent stock dividend and has filed a certificate increasing authorized capital from $250,000 to $500,000. Business currently is running 50 per cent ahead of last year. The plant employs about 450 people.

New Rubber Goods

Vassar Rubber Wavers

Rubber hair curlers, under the name of Vassar Wavers, are being featured by W. J. Caley and Company, Philadelphia, Penna. The curlers are simply 4-

inch strips of green rubber, with a slot in the center and a hole in one end. The other end of the curler is arrow-shaped, the hair being slipped through the center slot and the curler folded over to form curls, the arrow-head end slipping through the hole at the other end and acting as an effective catch. W. J. Caley, president of the company, estimates that more than 100 tons of rubber will be used to produce Vassar Wavers this year.

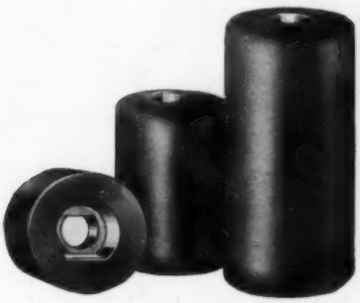
Velvet Grip Bicycle Flap

Molded of rubber to a shape that fits bicycle mud guards, the Velvet Grip Bicycle Flap has been introduced by the Tingley-Reliance Rubber Corporation, Rahway, N. J. A spring molded in the clamp gives the flap a vise-like grip. The more the nut is

tightened, the firmer the clamp grasps the stand clamp. The new flap is easy to apply. It is being carried in plain and chrome and jewel models.

New Flexible Couplings

Two new flexible couplings have been introduced on the market, each utilizing rubber in its construction. For drives of less than one horsepower, the Henry Engineering Company, 7401 Sangamon Street, Chicago, is featuring a coupling consisting of metal rings with a flat segment in a circular bore molded into the two ends of a cylinder of soft rubber. Elimination of metal surface parts is said to give full flexibility throughout the entire length of the coupling. It is light in weight, will not throw small rotors out of balance, operates silently, and has no loosely connected



Henry Flexible Couplings

parts to vibrate or rattle. The Henry Flexible Coupling is available in lengths from 1¼ to 4¼ inches, with bores of from ¼ to ¾ inch. The second new coupling is one manufactured by Certified Flexible Couplings, Inc., 122 East 42nd Street, New York City. Available in three sizes from ½ to 5 h.p. at 1750 r.p.m., this coupling consists of identical die-cast driving members and an oil-resisting rubber spider. The rubber spider, used between the coupling halves, has lugs which are convex curved and

Certified Flexible Coupling

mate with the concave curved surfaces in the lugs on the two coupling halves. In this manner uniform compression on the insert is maintained even when the coupling operates under misalignment. Overall length ranges from 1 9/16 to 2⅞ inch, maximum bore being from ½ to 3 inches. The company supplies extra rubber spiders for replacement.

Surety Turn Cuff Gloves

Termed the first major improvement in household rubber gloves in 25 years, the Surety Turn Cuff Gloves have been introduced by the Surety Rubber Com-

pany, Carrollton, Ohio. The new style gloves are made 12 inches in length with cuff flared at wrist and are ridge shaped in cuff to permit turning up at ridge when needed (without distortion or stress on the rubber), thereby forming a trough to prevent liquids from running over the end of the glove onto arms and clothing. Surety is also featuring lineman and acid gloves in the turn cuff style. In the lineman glove the turn cuff is of value in deflecting static or current from creeping over the surface to the user's arms in wet weather. The turn cuff style is also available in acid gloves made of neoprene which are said to have proved satisfactory for use in most rubber solvent chemicals, especially petroleum hydrocarbons.

Nu-Way Auto Rubber Sponge

The U. S. Rubber Specialty Company, Trenton, N. J., is currently merchandising two forms of an auto rubber sponge, both of which are equipped with handles and couplings which fit all standard hose. These handy items, which "rinse as they rub," are made of close-grained sponge rubber. The sponge itself is always clean and ready for instant use through the outflow of fresh water direct from the tap. The company re-

cently added an improvement by placing a rubber guard over the coupling so that cars could not be scratched while the sponge was being used. Several chain store organizations are featuring these items.

MARKETS

RUBBER—COTTON AND FABRICS—CHEMICALS

NEW YORK, AUGUST 10, 1937

Crude Rubber

PRINCIPALLY due to the fact that trade and speculative interests alike maintained a waiting attitude toward the market, crude rubber prices dropped steadily during the month of July since our last report of a 19.21 price on July 8. Increased offerings from abroad, a moderate increase in British stocks and bearish shipment figures from the Far East also contributed to the downward tendency. Stimulated by reports of substantial sales of actuals in Far Eastern markets to Japan and a better tone in the London market, prices advanced by 50 points in the first week of August, from 18.25 on August 3 to 18.75 on August 9, but followed the break on foreign exchanges and dropped sharply to 18.44 today (August 10). Because factory interests continue apathetic at current prices, a further decline is anticipated unless available stocks tighten up in the next few weeks. A return to higher prices is anticipated for the Fall. Quotations in the outside market, Exchange, London and Singapore, follow:

As of August 10

Plantations—

Ribbed Smoked Sheets—			
No. 1 Spot	—	@	.18⅞
October-December	—	@	.18⅛
January-March	—	@	.18⅛
No. 2	—	@	.18¼
No. 3	—	@	.18⅛
No. 4	—	@	.18⅜
Thin Latex Crepe	—	@	.19¾
Thick Latex Crepe	—	@	.20
Brown Crepe, No. 1	—	@	.17⅛
Brown Crepe, No. 2	—	@	.17
Amber Crepe, No. 2	—	@	.17⅛
Amber Crepe, No. 3	—	@	.17
Amber Crepe, No. 4	—	@	.16¼
Brown Crepe, Rolled	—	@	.14½

Latex—

Liquid Latex, per gal.	.66	@	.67

Paras—

Up-River, fine	—	@	.20¼
Acre Bolivian, fine	—	@	.20½

Balata—

Block, Ciudad	—	@	.30

LONDON MARKET

Standard Smoked Sheets—Buyers—August 10

October-December	—	@	9d
January-March	—	@	9⅛d

SINGAPORE MARKET

Standard Smoked Sheets—Sellers—August 10

October-December	—	@	8⅝d
January-March	—	@	8⅛d

Reclaimed Rubber

Although there are some indications of the usual Summer slump, reclaimers report increased demands in other directions are balancing the trade to a point where the high optimism for the balance of the year continues. A drop in demand from the automotive industry is shortly expected but will probably pick up again promptly as production starts on the new models. There has been no change in the price situation since our last report. Current quotations follow:

Shoe

Unwashed ..... lb.	.07	@	.07¼
Washed ..... lb.	.10	@	.10½

Tube

No. 1 (Floating) ..... lb.	.19	@	.19¼
No. 2 (Compounded) ..... lb.	.10½	@	.11
Red tube ..... lb.	.10½	@	.11

Tires

Black (acid process) ..... lb.	.07¼	@	.07½
Black, selected tires ..... lb.	.06¼	@	.06½
Dark Gray ..... lb.	.10	@	.10½
White ..... lb.	.15	@	.15½
Truck, Heavy Gravity ..... lb.	.06½	@	.07
Truck, Light Gravity ..... lb.	.08	@	.08½

Miscellaneous

Mechanical blends ..... lb.	.04½	@	.05

Scrap Rubber

(Delivered Akron Mills)

Reclaimers continue to purchase all available grades of scrap, although the market has been rather quiet since our last report. Increased demand from reclaimers is expected shortly when the latter will require additional scrap for increased capacity. There have been no changes in prices since our last report. Current quotations follow:

(Prices to Consumers)

Auto tire peelings ..... ton	23.50	@	25.00
Mixed auto ..... ton	14.50	@	15.00
Beadless tires ..... ton	19.00	@	20.00
Clean solid truck tires ..... ton	29.00	@	31.00
Boots and shoes ..... ton	22.50	@	25.00
Arctics, untrimmed ..... ton	17.50	@	21.50
Inner tubes, No. 1 ..... lb.	.12	@	.13
Inner tubes, No. 2 ..... lb.	.06⅛	@	.06¼
Inner tubes, Red ..... lb.	.06⅛	@	.06¼

Cotton

Based on the growing impression that crop developments promise an excellent yield this season, cotton prices started a downward trend since our last report. This trend was hastened by a statement issued by President Roosevelt on July 23 suggesting a 14,500,000-bale production this season and possibilities of 8-cent cotton two years hence. Waves of long liquidation followed with the result that prices broke from 11.80 on July 23 to 11.40 on July 26. The price continued downward for the next several days although interest shown by the trade around an approximate 11-cent price had a short rallying effect. Uncertainty in the last few days with regard to what the Government might do in the way of a crop loan has considerably deterred both short selling and regular trade business, with the result that the price touched a new low for the season today (August 10) being quoted at 10.79 cents. Quotations for middling uplands on the N. Y. Cotton Exchange follow:

	July 8	August 10		
	Close	High	Low	Close
September	12.31	10.34	10.34	10.34
December	12.29	10.35	10.26	10.32
March	....	10.48	10.40	10.44

Tire Fabrics

(Prices Net at the Mill)

Peeler, carded, 23/5/3 ..... lb.	.32½	@	.32¾
Peeler, carded, 23/4/3 ..... lb.	.33½	@	.33¾
Peeler, carded, 15/3/3 ..... lb.	.30½	@	.30¾
Peeler, carded, 13/3/3 ..... lb.	.29½	@	.29¾
Egyptian, carded, 23/5/3 ..... lb.	.47	@	.47½
Egyptian, combed, 23/5/3 ..... lb.	.52	@	.52½
CHAFERS			
Carded, American, $1\frac{1}{16}$" ..... lb.	.32½	@	.33½
Carded, American, 1" ..... lb.	.28½	@	.32

Sheetings

48x40	36 in.	5.50	lb.	— @	.05¼
40x40	36 in.	6.15	lb.	— @	.04¾
40x36	36 in.	6.50	lb.	— @	.04¼
48x48	40 in.	2.50	lb.	— @	.10¾
48x48	40 in.	2.85	lb.	— @	.09⅛
56x60	40 in.	3.60	lb.	— @	.09
48x44	40 in.	3.75	lb.	— @	.07⅝
44x40	40 in.	4.25	lb.	— @	.06¾

Ducks

Enameling (single filling) ..... lb.	.29	@	.32
Belting and Hose ..... lb.	.29½	@	.30
Single filling, A grade ..... lb.	.13½	@	.14
Double filling ..... lb.	.14½	@	.15

Closing Rubber Prices on New York Commodity Exchange, Inc.

No. 1 Standard Contract of 10 tons

FROM JULY 9 TO AUGUST 10

Date	Spot	July	Aug.	Sept.	Oct.	Nov.	Dec.	Jan.	Feb.	Mar.	Apr.	May	June	Sales
July 9	19.06	19.03	19.12	19.21	19.25	19.29	19.33	19.39	19.45	19.50	19.59	19.66	19.72	114
10	——	——	——	——	——	——	——	——	——	——	——	——	——	——
11	——	——	——	——	——	——	——	——	——	——	——	——	——	——
12	19.00	18.96	19.04	19.11	19.16	19.22	19.28	19.34	19.40	19.46	19.52	19.59	19.66	197
13	19.00	18.90	18.98	19.05	19.09	19.13	19.17	19.22	19.27	19.33	19.39	19.45	19.51	139
14	19.11	19.05	19.13	19.20	19.24	19.28	19.31	19.35	19.40	19.45	19.51	19.58	19.64	184
15	19.15	19.11	19.19	19.26	19.29	19.35	19.40	19.44	19.48	19.52	19.58	19.65	19.71	137
16	18.90	18.83	18.91	18.98	19.03	19.07	19.11	19.18	19.22	19.27	19.33	19.40	19.46	97
17	——	——	——	——	——	——	——	——	——	——	——	——	——	——
18	——	——	——	——	——	——	——	——	——	——	——	——	——	——
19	18.90	18.77	18.84	18.92	18.99	19.01	19.04	19.08	19.12	19.15	19.22	19.29	19.35	136
20	18.88	18.84	18.91	18.98	19.03	19.07	19.10	19.14	19.17	19.21	19.26	19.31	19.37	128
21	18.67	18.67	18.71	18.76	18.79	18.82	18.87	18.91	18.95	18.99	19.04	19.09	19.14	251
22	18.78	18.78	18.83	18.86	18.92	18.97	19.00	19.04	19.07	19.10	19.16	19.21	19.27	295
23	18.40	18.44	18.46	18.48	18.53	18.57	18.61	18.65	18.68	18.71	18.76	18.81	18.86	472
24	——	——	——	——	——	——	——	——	——	——	——	——	——	——
25	——	——	——	——	——	——	——	——	——	——	——	——	——	——
26	18.32	18.34	18.36	18.38	18.42	18.46	18.49	18.54	18.57	18.60	18.65	18.70	18.75	370
27	18.38	18.41	18.42	18.45	18.48	18.51	18.55	18.58	18.61	18.64	18.70	18.75	18.80	339
28	18.25	——	18.30	18.33	18.34	18.39	18.43	18.47	18.51	18.55	18.60	18.65	18.70	169
29	18.32	——	18.29	18.32	18.36	18.40	18.45	18.48	18.51	18.55	18.60	18.65	18.70	59
30	18.38	——	18.40	18.42	18.47	18.52	18.58	18.61	18.64	18.68	18.69	18.70	18.74	84
31	——	——	——	——	——	——	——	——	——	——	——	——	——	——
Aug. 1	——	——	——	——	——	——	——	——	——	——	——	——	——	——
2	18.38	18.43	18.45	18.48	18.52	18.56	18.58	18.61	18.64	18.68	18.73	18.78	18.82	76
3	18.25	18.24	18.26	18.30	18.34	18.39	18.43	18.47	18.51	18.55	18.60	18.65	18.70	339
4	18.50	18.55	18.57	18.61	18.65	18.70	18.73	18.76	18.80	18.83	18.87	18.91	18.95	207
5	18.63	18.70	18.72	18.76	18.80	18.84	18.88	18.92	18.96	19.00	19.05	19.09	19.13	129
6	18.69	18.72	18.74	18.78	18.83	18.88	18.93	18.95	18.96	19.00	19.05	19.09	19.13	87
7	——	——	——	——	——	——	——	——	——	——	——	——	——	——
8	——	——	——	——	——	——	——	——	——	——	——	——	——	——
9	18.75	18.74	18.76	18.80	18.84	18.89	18.92	18.96	19.00	19.04	19.08	19.12	19.16	167
10	18.44	18.48	18.50	18.53	18.57	18.61	18.64	18.68	18.72	18.76	18.81	18.85	18.89	250

Rubber CHEMICAL Markets

NEW YORK, AUGUST 10, 1937 [All Quotations F.O.B. Works Unless Otherwise Noted]

ACCELERATORS

Organic			
A-1 (Thiocarbanilid)	lb.	.26 @	—
A-5-10	lb.	.34 @	—
A-11	lb.	.57 @	—
A-19	lb.	.57 @	—
A-32	lb.	.72 @	—
A-77	lb.	.47 @	—
A-100	lb.	.47 @	—
A-433	lb.	.50 @	—
Aldehyde ammonia, crystals	lb.	.65 @	.70
Altax	lb.	— @	—
Captax	lb.		
Crylene	lb.	.55 @	.65
paste	lb.	.45 @	.55
Di-Ortho-Tolyguanidine	lb.	.44 @	.47
Diphenylguanidine	lb.	.37 @	—
El-Sixty	lb.	.57 @	—
Ethylidene aniline	lb.	.45 @	.47½
Formaldehyde aniline	lb.	.37½ @	.42
Guantal	lb.	.45 @	—
Heptene	lb.	.40 @	—
Hexamethylenetetramine	lb.	.36 @	—
Lead Oleate, No. 999	lb.	.12 @	—
Witco	lb.	.12 @	—
Lithex	lb.	.18 @	.20
Methylenedianiline	lb.	.36 @	.37
Monex	lb.	3.25 @	—
Oxynone	lb.	.68 @	—
Phenex	lb.	.50 @	.55
Pip-Pip	lb.	2.50 @	—
Pipsolene	lb.	1.75 @	—
R & H 40	lb.	.40 @	.41
R & H 50	lb.	.40 @	.41
R-2	lb.	1.65 @	—
R-23	lb.	.57 @	—
Satex	lb.	1.20 @	1.25
SPDX	lb.	.75 @	—
Super-Sulphur No. 1	lb.		
No. 2	lb.		
Thiocarbanilid, drums	lb.	.26 @	—
Trimene	lb.	.75 @	—
base	lb.	1.20 @	—
Triphenylguanidine	lb.	.58 @	.60
Tuads	lb.		
Ureka	lb.	.65 @	—
Ureka Blend B	lb.	.65 @	—
Ureka C	lb.	.60 @	—
Vulcanex	lb.		
Vulcone	lb.		
Vulcanol	lb.		
Z-88-P	lb.	.51 @	—
Zimate	lb.		
Inorganic			
Litharge, domestic	lb.	.07½ @	.08½
Magnesia, calcined, heavy	lb.	.04 @	—

COLORS

Blacks (See Compounding Materials)			
Blues			
Prussian	lb.	.36 @	.37
Ultramarine	lb.	.15 @	—
Browns			
Mapico	lb.	.13 @	—
Umber, Turkey	lb	.04 @	.04½
Greens			
Chrome	lb.	.21 @	—
Chromium Oxide, bbl.	lb.	.21 @	—
Guignet's Green	lb.	.70 @	—
Reds			
Antimony			
crimson, 15/17	lb.	.48 @	—
sulfur, free	lb.	.48 @	.60
Indian English	lb.	.09 @	.10
Domestic (Maroon)	lb.	.11 @	—
Red oxide, pure	lb.	.10 @	.12
Rub-Er-Red, f.o.b. Easton	lb.	.09¼ @	—
Whites			
Cryptone, No. 19	lb.	.05⅞ @	.06⅛
Cryptone CB, No. 21	lb.	.05⅞ @	.06⅛
Cryptone, ZS-20	lb.	.09 @	.09¼
Cryptone, ZS-86	lb.	.09 @	.09½
Lithopone			
Albalith, black label—11	lb.	.04¾ @	.04⅝
Azolith	lb.	.04⅜ @	.04⅝
Rayox	lb.		
Titanox A	lb.	.16 @	.16¾
Titanox B	lb.	.05⅞ @	.06⅛
Titanox C	lb.	.05⅞ @	.06⅛
Zinc Oxide—American Process			
American Azo:			
ZZZ (lead free)	lb.	.06¼ @	.06½
Anaconda, lead free	lb.	.06¼ @	.06½
Horsehead Lead Free Brand:			
Special—3	lb.	.06¼ @	.06½
XX Red—4	lb.	.06¼ @	.06½
XX Red—72	lb.	.06¼ @	.06½
XX Red—78	lb.	.06¼ @	.06½
XX Red—103	lb.	.06½ @	.06¾
Kadox, black label—15	lb.	.06½ @	.06¾
Blue label—16	lb.	.06½ @	.06¾
Red label—17	lb.	.06½ @	.06¾
St. Joe, black label	lb.	.06¼ @	.06½
green label	lb.	.06¼ @	.06½
red label	lb.	.06¼ @	.06½
U. S. P.—7, bbls.	lb.	.09 @	.09¼
Zinc Oxide—French Process			
Florence White seal—7 bbls.	lb.	.08½ @	.08¾
Green seal—8	lb.	.08 @	.08¼
Red seal—9	lb.	.07½ @	.07¾
Yellows			
Chrome	lb.	.14½ @	.15½
Mapico	lb.	.09½ @	—

BLACKS

Arrow "Aerfloted" Specification	lb.	.0535 @	.0825
Bone, powdered	lb.	.05½ @	.12½
Carbon, compressed	lb.	.0535 @	.0825
uncompressed	lb.	.0535 @	.0825
"Certified," Cabot	lb.	.0535 @	.0825
Spherons	lb.	.0535 @	.0825
"Disperso"	lb.	.0535 @	.0825
Drop, bbls.	lb.	.05½ @	.14
"Excello," compressed	lb.	.0535 @	.0825
"Fumonex"	lb.	.03 @	.07
"Gastex"	lb.	.03 @	.07
Lampblack	lb.	.07 @	.12
"Micronex"	lb.	.0535 @	.0825
"Supreme"	lb.	.0535 @	.0825
Thermatomic—"P 33"	lb.	— @	—
"Thermax"	lb.	— @	—
United "Dixie" & "Kosmos"	lb.	.0535 @	.0825

COMPOUNDING MATERIALS

Aluminum Flake	ton.	21.85 @	24.50
Ammonia carbonate, lump	lb.	.10½ @	.12
Asbestine	ton	13.00 @	15.00
Barium carbonate (98-100%)	ton	56.50 @	62.50
Barium Dust	lb.	.05 @	.06
Barytes	ton	23.65 @	31.15
Basofor	lb.	.04½ @	—
Bentonite	lb.	.02 @	.03
Blanc fixe dry f.o.b. works	ton	60.00 @	65.00
Calcene	ton	37.50 @	45.00
Catalpo (fact.)	lb.	.02 @	—
Chalk, precipitated			
Suprex white, extra lt.	ton	45.40 @	60.00
heavy	ton	45.00 @	55.00
Clay, Kaolin, domestic	ton	7.50 @	15.00
Aerfloted, Suprex	ton	9.00 @	21.00
Congaree	ton	9.00 @	—
Dixie	ton		
Dixie, Jr.	ton		
McNamee	ton		
Par	ton		
Tenaulite		15.00 @	—
Witco	ton	8.50 @	9.00
Cotton Flock	lb.	.11 @	.15
Glues, extra white	lb.	.28 @	.30
medium white	lb.	.14 @	.19
Kalite No. 1	ton	30.00 @	55.00
Kalite No. 3	ton	40.00 @	65.00
"Lime Crest" Industrial Filler No. 100	lb.	— @	—
Magnesium carbonate	lb.	.07 @	.09
Mica	ton	35.00 @	44.00
Pyrax A	ton	— @	—
Rottenstone (powdered)	lb.	.02½ @	.05
Soapstone, powdered	ton	16.00 @	22.00
Starch, powdered	cwt.	2.90 @	4.10
Talc, domestic	ton	17.00 @	20.00
Whiting, commercial	ton	17.00 @	18.00
Columbia Filler	ton	9.00 @	14.00
English Cliffstone	ton	33.00 @	43.00
Witco	ton	7.00 @	—
Wood Flour	ton	20.00 @	25.00
Zinc Carbonate	lb.	— @	.11½
Zinc Stearate	lb.	.20 @	.23

MINERAL RUBBER

Black Diamond	ton	27.00 @	—
Genasco, solid (factory)	ton	25.00 @	27.00
Hard Hydrocarbon	ton		
Parmr, solid	ton	25.00 @	—
Pioneer, MR, solid	ton		
Pioneer-granulated	ton		

MISCELLANEOUS

Aromatics—Rodo	lb.		
Curodex 19	lb.	2.75 @	—
Curodex 188	lb.	3.50 @	—
Curodex 198	lb.	4.50 @	—
Para-Dora No. 514	lb.	2.00 @	—
Aresklene No. 375 (dispersing, wetting and penetrating agent)	lb.	.40 @	—
Santomerse (dispensing, wetting, penetrating and stabilizing agent)	lb.	.17 @	—
Sunproof	lb.	.55 @	.57½
Sponge Paste	lb.	— @	.80
Tackol (tackifier)	lb.	.115 @	—
Tonox	lb.	.50 @	.60

SOFTENERS

Acids			
Acetic, 28%, bbls.	100 lb.	2.53 @	2.78
Nitric, 36 degrees	cwt.	5.00 @	6.00
Sulfuric, 66 degrees	ton	15.50 @	16.50
Acids, Fatty			
Laurex	lb.	.15 @	.16
Stearex Beads	lb.	.10¾ @	.11¾
Stearic, doub. pressed	lb.	.12½ @	.13½
Stearite	lb.	.10½ @	.11¾
Alkalies			
Caustic Soda 76%	cwt.	3.05 @	4.25
Soda Ash, 58% C.L.	cwt.	1.25 @	3.05
Oils			
Cycline Oil	gal.	.20 @	—
Degras, bbls.	lb.	.07¾ @	.08
Fluxrite	lb.	.05½ @	.06½
Palm Niger	lb.	.05½ @	.06½
Para-Flux	gal.	.17 @	—
Petrolatum, light	lb.	.03½ @	.03¾
Pigmentaroil, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
Pine, steam distilled	gal.	.64 @	.69
dest. dist., drums	gal.	.49 @	.50
Rosin Oil, cmpd	gal.	.40 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rubtack	lb.	.08 @	.10
Seedine, c.l.	lb.	.07¼ @	—
Tackol	lb.	.08½ @	.18
Witco Palm Oil	lb.	.07 @	—
Witco Softener	gal.	.18 @	—
Woburn No. 8, c.l.	lb.	.06 @	—
Wobonite, c.l.	lb.	.05 @	—
Resins and Pitches			
Pitch, Burgundy	lb.	.05½ @	.06½
coal tar	ton	19.00 @	22.00
hardwood	ton	16.00 @	22.50
pine, 200 lb. gr. wt.	bbl.	6.00 @	6.50
Pigmentar, tank cars	gal.	.16 @	—
in drums	gal.	.22½ @	.23½
R. S. L. Resin	lb.	— @	—
Retort Pine Tar, drums	ton	20.00 @	26.00
Solvents			
Acetone, pure	lb.	.06 @	.06½
Alcohol, denatured, methanol, No. 1 bbls.	gal.	.33 @	.39
Benzene, 90%	gal.	.18 @	.23
Beta-Trichlorethane	gal.	— @	—
Bondogen	lb.	— @	—
Carbon, bisulfide	lb.	.05¼ @	.08
Carbon, tetrachloride	lb.	.05¾ @	.08
Dichlorethylene	lb.	.29 @	—
Dipentene, cml., drums	gal.	.41 @	.50
Dryolene (f.o.b. Okla.)	gal.	.10 @	.10½
Ethylene dichloride	lb.	.05½ @	.06½
Plastogen	lb.		
Reogen	lb.		
Rub-Sol (f.o.b. Okla.)	gal.	.09 @	—
Trichlorethylene	lb.	— @	.09½
Turpentine, spirits	gal.	.43 @	.47
dest. dist., drums	gal.	.33 @	.41
Waxes			
Beeswax, white	lb.	.39 @	.45
Carnauba, yellow	lb.	.46 @	.47½
Ceresin, white, dom.	lb.	.08 @	.11
Montan, crude	lb.	.10¼ @	.11¾
Paraffin (c.l.—f.o.b. N. Y.)			
Yellow crude scale	lb.	.02¾ @	—
White crude scale 124/126	lb.	.02¾ @	.03
Refined, 122/127	lb.	.04½ @	—

ANTI-OXIDANTS

AgeRite, Gel	lb.		
HP	lb.		
Powder	lb.		
Resin	lb.		
White	lb.		
Albasan	lb.	.70 @	.75
Antox	lb.		
B-L-E	lb.	.57 @	.60
Flectol H	lb.	.54 @	—
Flectol White	lb.	1.00 @	—
Flectol B	lb.	.54 @	—
Neozone	lb.		
Oxynone	lb.	.68 @	—
Perflectol	lb.	.67 @	.75
Retardex	lb.	.55 @	.65
Santoflex A	lb.	— @	—
Santoflex B	lb.	.54 @	—
Stabilite	lb.	.57 @	.62
Stabilite Alba	lb.	.70 @	.75
VGB	lb.	.55 @	.60

MOLD LUBRICANTS

Aresklene	lb.	— @	—
Cocoa Soapstock	lb.	.06 @	.08
Dipex	lb.	.06 @	.08
Lubrex	lb.	.25 @	.30
Mold Paste	lb.	.18 @	—
Rubberol, f.o.b. Chicago	lb.	.13½ @	.14
Rusco, f.o.b. Nitro	lb.	.25 @	.30
Sericite, f.o.b. N. Y.	ton	65.00 @	—
Soap Tree Bark, cut, sifted	lb.	.06 @	.08

FACTICE OR RUBBER SUBSTITUTES

Amberex	lb.	.23 @	—
Black	lb.	.08½ @	—
White	lb.	.095 @	.15
Brown	lb.	.095 @	.14
Neophax	lb.	.13 @	—

VULCANIZING INGREDIENTS

Sulfur Chloride, yellow (drs.)	lb.	.02½ @	.04
Sulfur flour.			
Refined, 100% pure (bags)	cwt.	2.55 @	3.65
Commercial (bags)	cwt.	1.60 @	2.35
Telloy	lb.		
Vandex	lb.		

Crude Rubber
Latex and Guayule
Reclaimed Rubber
Tires and Tubes

STATISTICS OF THE INDUSTRY

Rim Production
Automobiles
Gasoline
Cotton Prices

U. S. Imports and Exports of Crude Rubber

YEARS	Gross Imports: Long Tons	Gross Imports: Total Declared Value	Gross Imports: Average Declared Value per pound Cents	Re-exports: Long Tons	Re-exports: Total Declared Value	Re-exports: Average Declared Value per pound Cents	Net Imports: Long Tons
1922	301,076	101,843,188	15.10	4,809	1,921,828	17.84	296,267
1923	309,362	185,060,304	26.71	8,772	5,672,319	28.87	300,590
1924	325,899	173,367,272	23.75	10,309	6,057,637	26.23	315,590
1925	393,370	426,167,504	48.36	14,827	19,847,753	59.76	378,543
1926	409,944	501,131,064	54.57	17,671	22,470,583	56.77	392,273
1927	424,733	338,688,492	35.60	27,775	24,735,488	39.76	396,958
1928	432,633	242,727,423	25.05	32,159	18,128,761	25.17	400,474
1929	560,082	239,177,811	19.06	36,485	16,868,718	20.64	523,597
1930	482,083	139,133,048	12.88	30,205	9,310,205	13.76	451,878
1931	497,176	72,922,845	6.55	25,595	4,255,572	7.42	471,581
1932	409,556	31,936,459	3.48	20,930	2,015,612	4.30	388,626
1933	407,817	44,034,064	4.82	20,537	2,601,352	5.65	387,280
1934	449,513	97,929,676	9.73	23,848	5,770,109	10.80	425,665
1935	453,134	115,299,448	11.36	11,389	3,084,331	12.09	441,745
1936	467,064	152,072,496	14.54	12,581	4,488,223	15.93	454,483
1935:							
Dec.	38,417	9,930,710	11.54	1,821	523,997	12.85	36,596
1936:							
Jan.*	32,310	8,637,997	11.94	733	229,129	13.98	31,577
Feb.	32,879	9,293,711	12.62	625	199,956	14.27	32,254
Mar.*	33,447	9,845,776	13.14	1,172	390,551	14.88	32,275
Apr.*	44,218	13,967,712	14.10	984	343,785	15.59	43,234
May*	35,578	11,460,157	14.38	1,589	580,021	16.30	33,989
June	36,376	12,073,632	14.82	2,469	904,669	16.35	33,907
July	38,178	12,763,200	14.92	1,383	510,075	16.47	36,795
Aug.	40,027	13,364,916	14.91	840	307,114	16.32	39,187
Sept.*	48,368	16,691,919	15.41	656	244,554	16.64	47,712
Oct.	39,573	13,627,465	15.37	778	268,645	15.42	38,795
Nov.*	36,798	12,790,306	15.52	675	241,982	15.99	36,123
Dec.	49,312	17,555,705	15.89	677	267,745	17.65	48,635
1937:							
Jan.	42,002	15,408,242	16.38	844	372,053	19.69	41,158
Feb.	42,743	16,470,867	17.20	523	236,853	20.21	42,220
Mar.	38,682	16,030,267	18.50	1,146	522,931	20.37	37,536
Apr.	41,[illegible]	17,859,223	19.31	1,050	415,484	17.66	40,225
May	46,902	22,163,440	21.10	528	270,499	21.08	46,374
June	47,073	22,559,545	21.39	807	390,542	21.60	46,266

* Revised.

Note: Annual figures for 1922-1936 revised on basis of information received on February 8, 1937. Figures for 1922 and 1923 include latex; guayule is included only in 1922.

United States Imports of Guayule, Balata, Jelutong, Liquid Latex

(All Quantities in Long Tons)

	Guayule Tons	Guayule Dollars	Balata Tons	Balata Dollars	Jelutong Tons	Jelutong Dollars	Liquid Latex (1) Tons	Liquid Latex (1) Dollars
1924	1,356	536,392	464	568,456	6,165	1,237,100	2,157	864,059
1925	3,781	1,803,448	517	574,750	6,749	1,642,531	3,272	3,537,510
1926	4,305	2,562,096	354	327,213	7,263	3,127,757	3,394	4,686,743
1927	5,018	2,674,957	582	477,246	7,785	2,448,657	1,495	1,170,650
1928	3,077	1,755,685	731	430,855	7,552	2,540,059	4,007	2,121,786
1929	1,275	545,175	728	566,694	8,204	2,458,126	3,729	1,788,391
1930	1,096	347,388	502	422,684	5,907	1,403,244	4,458	1,508,786
1931	....	.....	1,207	411,380	5,777	1,019,010	4,675	888,909
1932	....	.....	707	147,403	4,607	616,596	5,112	601,999
1933	....	.....	1,659	2,261,869	5,990	944,895	11,085	1,833,671
1934	398	75,349	1,054	438,209	4,987	943,752	13,107	3,643,221
1935	459	86,835	615	188,384	5,644	1,063,126	13,553	3,782,222
1936	1,229	286,552	535	199,368	6,163	1,296,364	19,852	6,659,899
1936:								
Aug.	146	37,147	72	23,715	321	64,769	1,761	602,992
Sept.	106	29,335	21	9,846	418	85,624	1,800	692,810
Oct.	114	31,489	11	4,815	452	102,485	1,392	500,817
Nov.	159	43,980	43	19,408	405	91,538	1,631	578,729
Dec.	134	36,972	14	7,247	538	109,208	2,070	735,156
1937:								
Jan.	160	44,166	10	4,348	247	56,056	1,337	535,546
Feb.	206	56,807	14	5,838	242	61,741	1,973	775,202
Mar.	136	37,453	29	13,949	898	187,413	2,216	968,053
Apr.	190	52,361	3	1,457	617	135,412	1,633	724,757
May	182	50,093	75	33,881	642	145,618	1,995	941,235
June	147	39,941	91	41,481	488	135,468	2,561	1,253,370

(1) Weight given in pounds of dry rubber contained in latex.

Note: Annual figures for 1924-1936 revised on basis of information received on February 8, 1937.

U. S. Consumption of Crude Rubber

(Rubber Manufacturers' Association statistics raised to 100 per cent—All figures in long tons)
(All Quantities in Long Tons)

	Figures on Monthly Basis: 1930	1931	1932	1933	1934	1935	1936*	1937
Jan.	36,194	28,557	29,648	22,645*	39,190*	46,636*	48,631	50,818*
Feb.	33,302	28,797	31,821	21,392*	40,515*	42,720*	36,841	51,887*
Mar.	35,540	32,788	29,505	17,483*	47,003*	42,153*	42,813	54,064*
Apr.	39,686	33,321	27,518	25,928	44,853*	44,247*	52,031	51,797
May	39,386	37,817	30,957	44,074	42,918*	41,101*	50,612	51,733
June	34,195	37,916	41,475	50,743*	40,147*	36,156*	52,772	51,798
July	29,508	31,397	29,976	49,614*	32,553*	35,917*	48,250	.....
Aug.	30,850	27,586	23,721	44,428*	33,216*	38,775*	46,777	.....
Sept.	25,515	23,638	23,847	35,281*	30,258*	37,086*	46,449	.....
Oct.	27,516	22,277	22,286	31,543*	31,253*	41,969*	49,637	.....
Nov.	23,691	22,943	23,231	28,831*	34,748*	42,310*	50,433	.....
Dec.	21,687	21,409	18,015	28,757*	36,569*	42,474*	49,754	.....
Tot.	375,980	348,986	332,000	400,719*	453,223*	491,544*	575,000	.....

* Revised.

Note: Figures for 1936 were revised on May 15, 1937, and are now based on Department of Commerce survey figures.

Reclaimed Rubber in the United States

(All Quantities in Long Tons)

Year	Production	Consumption Tons	Consumption % to Crude	Stocks[a]	Year	Production	Consumption Tons	Consumption % to Crude	Stocks[a]
1927	189,144	178,471	47.6	24,980	1932	75,608	77,504	23.4	16,354
1928	208,516	223,000	50.4	24,785	1933	99,560	81,602	19.9	20,746
1929	218,954	226,589	48.4	27,464	1934	110,010	100,597	22.2	23,079
1930	157,967	153,497	40.8	22,006	1935	122,948	113,078*	23.0[a]	25,069
1931	133,351	124,126	33.9	19,257	1936	150,571	130,048	22.7	30,573

1936*:	Figures on Monthly Basis								
Jan.	11,665	10,922	22.5	17,171	July	12,330	12,856	26.6	16,207
Feb.	10,188	8,014	21.8	18,890	Aug.	12,856	11,959	25.6	16,487
Mar.	10,712	9,539	22.3	19,472	Sept.	12,959	12,153	26.2	16,711
Apr.	11,382	11,241	21.6	19,024	Oct.	14,737	13,715	27.6	17,141
May	11,512	11,311	22.3	18,590	Nov.	14,357	13,087	25.9	17,900
June	11,935	12,563	23.8	17,366	Dec.	15,938	14,126	28.4	19,000
1937:									
Jan.*	15,129	14,450	28.4	18,822	July	.....	.....	...	.....
Feb.*	15,192	14,578	28.1	18,490	Aug.	.....	.....	...	.....
Mar.*	14,462	15,601	28.9	16,450	Sept.	.....	.....	...	.....
Apr.	13,884	15,607	30.1	14,046	Oct.	.....	.....	...	....
May	15,793	14,693	28.4	14,647	Nov.	.....	.....	...	...
June	16,052	14,414	27.8	14,535	Dec.	.....	.....	...	.....

[a] Stocks on hand at the end of month or year.
* Revised.

Note: Figures for 1936 were revised on June 1, 1937, and are now based on Department of Commerce survey figures.

U. S. Consumption of Gasoline

(Bureau of Mines Statistics)
(In Thousands of Barrels of 42 Gallons)

	1935	1936	1937		1935	1936	1937
January	28,147*	32,412*	33,696	August	43,097*	46,081	.....
February	26,580*	27,216*	32,000	September	37,976*	44,346	.....
March	32,272*	35,871	40,561	October	41,566*	44,253	.....
April	36,363*	38,825	43,409	November	35,991*	39,919	.....
May	39,381*	42,007	45,484	December	33,872*	39,393	.....
June	38,086*	44,630	.....				
July	41,479*	46,638*	.....	Total	434,810*	481,591	.....

* Revised.

Rims Inspected and Passed in U. S.

(Tire and Rim Association Reports)

	Total		Total		Total
1925	26,001,664	1929	24,141,502	1933	8,713,962
1926	24,199,524	1930	17,364,096	1934	12,255,118
1927	19,700,003	1931	11,253,800	1935	18,664,356
1928	24,247,282	1932	6,261,336	1936	20,790,098

1937:		1937:		1937:	
January ...	2,123,723	May	2,189,502	September ..	.....
February ..	2,022,258	June	2,141,810	October ...	.....
March	2,166,218	July	1,702,105	November ..	.....
April	2,269,680	August	.....	December ..	.....

Daily Spot Closing Prices of Ribbed Smoked Sheet Rubber—*New York Market, in Cents per Pound*

	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31	Ave.
1935																																
April	11	11	11	11	11	11	—	10	11	11	11	11	11	—	12	11	11	11	11	11	—	11	11	11	11	11	11	11	11	11	—	11
May	11	11	11	11	—	11	11	11	11	11	11	11	11	—	12	12	11	11	11	11	—	11	11	11	11	11	11	11	11	—	12	11
June	12	12	12	12	12	12	11	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
July	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
August	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12	12
September	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
October	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11	11
November	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
December	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13	13
1936																																
January	13	13	13	13	13	13	13	13	13	14	14	—	—	14	14	14	14	14	14	14	14	14	14	14	15	15	15	15	15	14	14	14
February	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
March	15	15	15	15	15	15	15	15	15	16	16	15	15	15	15	15	15	15	15	16	16	15	15	15	15	15	15	15	15	15	15	15
April	15	15	15	15	15	15	15	16	16	—	15	15	15	15	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
May	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
June	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15	15
July	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Aug.	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Sept.	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Oct.	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16	16
Nov.	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17	17
Dec.	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18
1937																																
Jan.	—	21	—	20	20	21	—	20	22	22	22	22	22	21	21	21	21	21	21	21	20	20	20	20	21	21	21	21	21	21	21	21
Feb.	—	21	—	21	21	21	—	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21	21
Mar.	—	21	—	21	22	22	—	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22	22
April	—	21	—	21	22	22	—	24	24	24	24	24	23	22	23	23	23	23	23	23	23	23	23	23	24	24	24	24	24	24	24	24
May	—	21	—	21	21	21	—	24	24	24	24	24	24	22	22	22	22	22	22	22	22	22	22	22	24	24	24	24	24	24	24	24
June	—	20	—	20	19	19	—	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
July	—	19	—	19	18	18	—	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19	19
Aug.	—	18	—	18	18	18	—	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18	18

Average Spot Closing Prices—Ribbed Smoked Sheets

(New York Market)

Average Price per Pound for Years 1910-1929

Year	Cents	Year	Cents	Year	Cents	Year	Cents	Year	Cents
1910	206.60	1914	65.33	1918	60.15	1922	17.50	1926	48.50
1911	141.30	1915	65.85	1919	48.70	1923	29.45	1927	37.72
1912	121.60	1916	72.50	1920	36.30	1924	26.20	1928	22.48
1913	82.04	1917	72.23	1921	16.36	1925	72.46	1929	20.58

Average Monthly Price per Pound Since 1930

	1930 Cents	1931 Cents	1932 Cents	1933 Cents	1934 Cents	1935 Cents	1936 Cents	1937 Cents
Jan.	15.24	8.34	4.38	3.08	9.32	13.10	14.35	21.37
Feb.	15.85	7.70	4.03	2.95	10.45	12.92	15.48	21.33
Mar.	15.34	7.71	3.35	3.01	11.01	11.51	15.89	24.09
Apr.	14.93	6.43	3.02	3.56	12.10	11.55	15.98	23.44
May	14.24	6.49	3.09	4.95	13.26	12.05	15.62	21.14
June	12.45	6.35	2.66	6.15	13.51	12.57	15.85	19.29
July	11.24	6.37	2.89	8.01	14.60	12.10	16.49	18.86
Aug.	9.96	5.38	3.63	7.31	15.47	11.98	16.25	
Sept.	8.28	5.08	3.84	7.30	15.36	11.55	16.46	
Oct.	8.20	4.87	3.65	7.64	13.96	12.62	16.55	
Nov.	9.01	4.65	3.44	8.66	13.04	13.15	17.97	
Dec.	9.05	4.64	3.24	8.87	12.98	13.28	20.01	
Average for Year	11.98	6.17	3.49	5.96	12.92	12.37	16.41	

London Closing Prices of Ribbed Smoked Sheets

(In Pence Per Pound)

Day	1937 May	1937 June	1937 July	1937 Aug.	Day	1937 May	1937 June	1937 July	1937 Aug.
1	10 1/16	9 1/8	9 3/4	—	17	—	9 1/2	—	
2	—	10	9 7/16	—	18	10	9 1/8	—	
3	10 1/16	9 1/8	—	8 3/4	19	10 1/4	—	9 1/16	
4	10 1/8	9 3/8	—	8 7/8	20	10 1/8	—	9 1/8	
5	10 3/8	—	9 7/16	8 1/8	21	10 1/4	9 3/8	8 7/8	
6	10 3/4	—	9 1/2	9	22	10 1/4	9 1/16	8 7/8	
7	10 3/4	9 5/8	9 3/8	—	23	—	9 1/2	8 3/4	
8	10 1/8	9 3/8	9 7/16	—	24	10 1/8	9 3/4	—	
9	—	9 1/8	9 1/16	9	25	10 1/16	9 7/8	—	
10	10 3/4	9 1/8	—	8 7/8	26	10 1/8	—	8 13/16	
11	10 3/8	9 1/8	—		27	10	—	8 13/16	
12	—	—	9 1/8		28	10	9 1/16	8 13/16	
13	10 1/4	—	9 1/8		29	10	9 1/2	8 3/4	
14	—	9 1/8	9 1/16		30	—	9 1/2	8 7/8	
15	—	9 3/8	9 1/4		31	9 1/8	—	—	
16	—	9 1/2	9 1/8						

Average Monthly Price Per Pound

Month	1934 Pence	1935 Pence	1936 Pence	1937 Pence	Month	1934 Pence	1935 Pence	1936 Pence	1937 Pence
Jan.	4.429	6.434	6.758	10.378	Aug.	7.401	5.696	7.581	
Feb.	4.920	6.292	7.255	10.503	Sept.	7.409	5.508	7.577	
Mar.	5.136	5.745	7.450	11.766	Oct.	6.806	6.130	7.898	
Apr.	5.712	5.604	7.502	11.471	Nov.	6.294	6.308	8.572	
May	6.207	5.822	7.335	10.250	Dec.	6.295	6.340	9.580	
June	6.245	6.027	7.352	9.548	Average for Year	6.159	5.976	7.713	
July	7.053	5.801	7.696	9.136					

Spot Closing Cotton Prices

(Middling Upland Grade—New York Market)

Recent Daily Price Per Pound

Date	1937 June	1937 July	1937 Aug.	Date	1937 June	1937 July	1937 Aug.	Date	1937 June	1937 July	1937 Aug.
1	13.22	12.62	—	11	12.61	—		22	12.55	12.14	
2	13.25	12.51	10.96	12	12.48	12.87		23	12.71	11.80	
3	13.19	12.49	11.04	13	—	12.94		24	12.61	11.72	
4	13.20	—	11.24	14	12.36	12.97		25	12.74	—	
5	13.24	—	11.35	15	12.39	12.60		26	12.76	11.40	
6	—	12.56	11.28	16	12.43	12.52		27	—	11.57	
7	12.79	12.62	11.24	17	12.51	12.52		28	12.70	11.44	
8	12.69	12.85	—	18	12.56	—		29	12.66	11.21	
9	12.49	13.05	10.82	19	12.44	12.51		30	12.54	11.23	
10	12.59	12.90	10.79	20	—	12.36		31	—	11.18	
				21	12.55	12.17					

Average Monthly Price Per Pound

	1934 Cents	1935 Cents	1936 Cents	1937 Cents		1934 Cents	1935 Cents	1936 Cents	1937 Cents
Jan.	11.25	12.70	11.91	13.06	Aug.	13.40	11.48	12.28	
Feb.	12.28	12.58	11.53	13.15	Sept.	13.00	10.80	12.31	
Mar.	12.30	11.63	11.43	14.46	Oct.	12.48	11.28	12.30	
Apr.	11.80	11.73	11.71	14.23	Nov.	12.53	12.01	12.23	
May	11.44	12.25	11.68	13.34	Dec.	12.76	11.99	12.83	
June	12.20	11.89	12.02	12.70	Average for Year	12.36	11.88	12.11	
July	12.84	12.26	13.11	12.26					

World Stocks of Crude Rubber

(All figures are in long tons)

ON HAND OR AFLOAT TO THE U. S.

At End of	ON HAND 1935	ON HAND 1936	ON HAND 1937	AFLOAT 1935	AFLOAT 1936	AFLOAT 1937	ON HAND AND AFLOAT 1935	ON HAND AND AFLOAT 1936	ON HAND AND AFLOAT 1937
Jan.	349,446	285,054*	201,915	42,066	43,870	55,096	391,512	328,924*	257,011
Feb.	340,264	282,902*	193,864	42,969	46,532	53,538	383,233	329,434*	247,402
Mar.	340,284	276,823*	191,928*	44,485	58,935	56,994	384,769	335,758*	248,922*
Apr.	337,586	277,478*	174,934	37,651	47,678	72,530	375,237	325,156*	247,464
May	322,558	262,415*	172,985	44,375	48,860	58,542	366,933	311,275*	231,527
June	324,218	245,544*	169,616	55,581	47,228	57,215	379,799	292,782*	226,861
July	334,692	234,498		49,018	60,343		383,710	294,841	
Aug.	334,106	229,056		47,724	63,597		381,830	292,653	
Sept.	331,121	228,477		43,413	62,240		374,534	290,717	
Oct.	322,857	219,553		49,913	67,825		371,770	287,378	
Nov.	308,993	212,515		46,588	73,691		355,581	286,206	
Dec.	303,000	218,844		39,094	56,567		342,094	275,411	

(Rubber Manufacturers' Association figures raised to 100%)

* Revised.

Note: Complete figures for 1934 and 1935 were revised by the R.M.A. on May 1, 1936.

STOCKS IN GREAT BRITAIN

(No. of Tons in Wharves and Warehouses, not including Latex)

At end of	London 1935	London 1936	London 1937	Liverpool 1935	Liverpool 1936	Liverpool 1937
January	81,807	84,791	29,005	66,405	77,188	41,895
February	87,605	79,757	26,508	67,983	77,138	37,078
March	92,664	74,779	21,292	69,218	72,823	30,622
April	94,361	68,932	21,128	70,584	71,388	27,443
May	95,722	61,349	21,351	71,927	69,150	25,081
June	98,077	55,993	21,964	73,131	66,173	21,258
July	99,226	49,575		74,915	63,715	
August	101,574	45,749		75,584	62,367	
September	101,198	44,364		76,263	59,485	
October	94,749	40,777		76,400	55,738	
November	90,542	37,495		76,301	51,184	
December	86,551	33,027		77,589	45,291	

(Figures from the Rubber Trade Association of London)

STOCKS IN OTHER CENTRES

(Figures from Statistical Bulletin of the Int'l Rubber Regulation Committee)

	Penang and Singapore [1]	Malaya [2]	Ceylon [3]	Holland	Para and Manaos
At end of 1936					
July	29,443	34,395	3,610	1,026	4,696
August	28,289	34,849	3,961	979	1,742*
September	26,936	33,351	3,930	911	1,817
October	24,593	34,941	3,490	773	1,820
November	26,761	33,469	3,415	588	1,948
December	26,969	35,145	5,161	409	2,454
At end of 1937					
January	36,365	41,911	5,024	290	4,005
February	42,132	44,346	5,855	197	3,763
March	42,485	40,317	3,477	108	4,078
April	38,812	38,443	3,745	101	3,840
May	34,234	40,253	3,781	94	3,488

[1] Dealers' and Port Stocks. [2] Inside Regulated Areas. [3] Dealers' Stocks Only.
* Revised.

RUBBER STOCKS AFLOAT

End of: 1936:	Afloat for United States	Afloat for Europe	All Other * Afloat	Total * Afloat
June	47,228	20,200	22,572	90,000
July	60,343	20,300	25,357	106,000
August	63,597	19,800	15,603	99,000
September	62,240	18,090	15,670	96,000
October	67,825	20,790	17,385	106,000
November	73,691	19,270	13,039	106,000
December	56,567	24,800	21,633	103,000
End of: 1937				
January	55,096	24,920	17,984	98,000
February	53,538	27,250	13,212	94,000
March	56,994	31,240	36,766	125,000
April	72,530	34,410	17,060	124,000
May	58,542	35,000	23,458	117,000
June	57,215	35,000	31,785	124,000

* *Total Afloat* is an arbitrary estimate based on 1½ months' shipments as adopted by the Department of Commerce. *All Other Afloat* is determined by subtracting the amount of stocks in transit to the United States and Europe from the estimated total.
P—Preliminary estimate

TOTAL WORLD STOCKS

(Figures from the Survey of Current Business)

At end of	1932	1933	1934	1935	1936*	1937
January	623,416*	634,797	661,948	698,153	600,479	454,249*
February	611,819*	626,227	663,308	686,195	599,355	445,265*
March	614,894*	638,428	666,382	678,809	583,318	447,856*
April	615,893*	629,159	658,796	677,006	567,172	428,249*
May	612,474*	626,537	689,239	677,569	541,871	414,000
June	595,712	613,055	672,804	671,525	520,255	.....
July	589,037	618,258	676,200	679,061	519,074	.....
August	597,274	617,449	674,702	680,644	500,520	.....
September	599,986	623,683	694,361	661,509	493,585	.....
October	609,368	636,597	680,616	655,000	486,159	.....
November	614,342	642,968	684,408	617,300*	466,491	.....
December	629,898	654,890	705,975	613,987*	466,576	.....
Monthly Avge.	609,502*	630,171	677,395	666,397*	528,738	.....

* Revised.

U. S. Tire and Tube Statistics[1]

(All Figures Represent Thousands)

AUTOMOBILE CASINGS

Figures for Recent Years

	1929	1930	1931	1932	1933	1934	1935	1936
Production	68,726	50,965	48,740	40,085	45,303	47,233	49,362	58,116
Shipments	69,395	53,638	50,061	40,251	44,094	46,687	50,183	55,363
Inventory [2]	11,838	9,003	7,775	7,644	8,888	9,455	8,196	11,114

Figures for Recent Months

	PRODUCTION 1935	PRODUCTION 1936*	PRODUCTION 1937	SHIPMENTS 1935	SHIPMENTS 1936*	SHIPMENTS 1937	INVENTORY 1935	INVENTORY 1936*	INVENTORY 1937
Jan.	4,626	4,579	4,980	3,663	3,875	4,509	10,398	8,917	11,377
Feb.	4,383	3,579	5,246	3,287	3,212	4,371	11,530	9,265	12,309
Mar.	4,346	3,640	5,916	4,204	3,857	5,787	11,675	9,087	12,448
Apr.	4,512	4,857	5,730	5,144	4,904	5,560	11,003	9,035	12,629
May	4,175	4,974	5,352	4,067	5,833	5,375	11,131	8,178	12,592
June	3,910	5,612		4,262	5,793		10,755	7,835	
July	3,532	5,466		5,447	5,744		8,850	7,750	
Aug.	3,993	5,017		4,739	4,977		7,805	7,799	
Sept.	3,787	4,984		3,303	3,837		8,288	9,012	
Oct.	4,051	5,126		4,055	4,082		8,291	10,096	
Nov.	3,997	4,972		3,930	4,233		8,249	10,823	
Dec.	4,051	5,311		4,081	5,016		8,196	11,114	

AUTOMOBILE INNER TUBES

Figures for Recent Years

	1929	1930	1931	1932	1933	1934	1935	1936
Production	68,829	52,420	48,333	36,891	42,556	46,228	47,879	57,607
Shipments	70,592	54,938	50,021	37,911	41,391	45,046	48,067	54,626
Inventory [2]	12,807	9,999	7,922	6,749	7,815	9,180	8,231	10,985

Figures for Recent Months

	PRODUCTION 1935	PRODUCTION 1936	PRODUCTION 1937	SHIPMENTS 1935	SHIPMENTS 1936	SHIPMENTS 1937	INVENTORY 1935	INVENTORY 1936	INVENTORY 1937
Jan.	4,259	4,592	4,801	3,722	4,168	4,391	9,621	8,623	11,100
Feb.	4,171	3,556	5,091	3,362	3,446	4,536	10,466	8,699	11,734
Mar.	4,123	3,787	5,823	4,168	3,796	5,570	10,406	8,692	11,904
Apr.	4,259	4,824	5,627	4,453	4,746	5,325	10,170	8,788	12,218
May	3,892	4,819	4,956	3,451	4,919	5,028	10,615	8,719	12,107
June	3,480	5,035		4,024	5,504		10,050	8,105	
July	3,251	5,177		5,269	5,758		8,005	7,725	
Aug.	3,894	5,039		4,556	5,136		6,939	7,621	
Sept.	4,125	5,161		3,426	4,231		7,565	8,627	
Oct.	4,435	5,397		3,987	4,108		8,053	9,977	
Nov.	3,942	4,739		3,687	3,995		8,161	10,732	
Dec.	4,048	5,121		3,962	4,819		8,231	10,985	

(1) These figures have been adjusted to represent 100% of the industry based on reports received by the Rubber Manufacturers' Association which represent 80% for 1931-1932-1933; 97% for 1934-1935; 81% for 1936. All figures through September, 1936, were revised in December, 1936. Annual figures are more accurate.
(2) Held by manufacturers at end of period indicated.
(*) Revised.

Automobile Production

	United States Total	United States Passenger Cars	United States Trucks	Canada Total	Canada Passenger Cars	Canada Trucks	Grand Total
1928	4,357,384	3,826,613	530,771	242,382	196,737	45,645	4,599,944
1929	5,358,420	4,587,400	771,020	263,295	207,498	55,797	5,621,715
1930	3,355,986	2,814,452	540,534	154,192	125,442	28,750	3,510,178
1931	2,389,730	1,973,090	416,640	82,621	63,477	19,144	2,472,351
1932	1,370,678	1,135,493	235,187	60,816	50,718	10,098	1,431,494
1933*	1,920,057	1,573,512	346,545	65,924	53,855	12,069	1,992,126
1934*	2,753,111	2,177,919	575,192	116,852	92,647	24,205	2,869,963
1935*	3,946,934	3,252,244	694,690	172,877	135,562	37,315	4,119,811
1936*	4,454,115	3,669,528	784,587	162,322	131,308	31,014	4,616,437
1936							
Aug.*	271,274	209,351	61,923	4,660	3,051	1,609	275,934
Sept.*	135,165	90,101	45,064	4,655	2,481	2,174	139,820
Oct.*	224,688	190,242	34,446	5,361	4,592	769	230,049
Nov.*	394,987	341,085	53,902	10,812	10,086	726	405,799
Dec.*	498,710	425,365	73,345	20,411	16,542	3,869	519,121
1937							
Jan.*	380,051	309,637	70,414	19,583	14,697*	4,886*	399,634
Feb.*	363,991	296,636	67,355	19,707	14,173*	5,534*	383,698
Mar.*	494,276	403,879	90,397	24,901*	19,127*	5,774*	519,177
Apr.	536,334	439,980	96,354	17,081	12,927	4,154	553,415
May	516,899	425,432	91,467	23,458	17,980	5,478	540,357
June	497,298	411,394	85,904	23,841	17,919	5,922	521,139

* Revised.
Note: U. S. figures represent factory sales; Canadian figures represent production.

Exports of Crude Rubber from Principal Producing Countries

(Long Tons)

	BRITISH MALAYA [1]							DUTCH EAST INDIES [2]						
	Gross Exports	Imports	Gross Exports Minus Imports	Ceylon [3]	India & Burma [4]	Sarawak [5]	British North Borneo [6]	Siam [7]	Java & Madura	Sumatra E. Coast	Other D.E.I.	Indo-China [8]	Amazon Valley	All Other [9]	World Total [10]
1923	252,016	70,432	181,584	39,971	6,416	5,705	4,237	1,718	32.930	46,344	57,822	5,067	16,765	7,856	406,415
1924	259,706	108.524	151,182	39,997	7,697	6,699	4,621	2.962	42.446	54.497	80.347	6,688	23,165	9,065	429.366
1925	316.825	158.022	158.803	49,566	10.082	5,424	5,377	5.377	46.757	65.499	120.626	7,881	25,298	13.797	514.487
1926	391,328	151,243	240,085	58,962	9,874	9,155	6.079	4.027	52,186	71,413	121.231	8,203	24,298	16.017	621,530
1927	371.322	182.845	188.477	55.356	11.321	10.923	6.582	5.472	55.297	77.815	142.171	8.645	28.782	15.633	606.474
1928	409,430	149,787	259,643	57,267	10,790	10,087	6,698	4,813	58.848	82,511	121,770	9,548	21,129	10,690	653.794
1929	574,836	163,092	411,744	81,584	11,663	11.077	7.381	5,018	65.990	87,789	134.037	9,696	21,148	6,767	853.894
1930	547,043	133,876	413,167	76.970	10,782	10.309	6.781	4,251	69,755	79,396	115,254	7,665	14.260	5.651	814.241
1931	519.740	125.506	394,234	61.769	8,470	10.451	6,247	4,218	75,952	87,747	116.009	11,696	12,121	3,292	792,203
1932	478.252	92.539	385.713	48.973	3,888	6.960	4,664	3.451	61.312	79,837	85.871	13.883	6.450	1.816	702,818
1933	573,412	167.377	406.035	63.351	4,527	10,874	7,555	7.765	73.851	91.861	149.659	18.394	9.883	2.737	846 312
1934	677.361	211.803	465.558	79.746	10.492	17.233	11,103	17.545	87.400	112,058	175.470	20,170	8,903	2.985	1,008.663
1935	590,319	174,652	415,667	54,316	13,968	19,465	8,885	28,327	57,488	78,325	139,297	28,816	11,275	8,745	864,574
1936	520,286	167,799	352,487	49,692	14,724	21,243	8,177	33,702	61,307	84,577	152,205	40,782	14,193	11,466	845,431
1935:															
Oct.	48,258	19,364	28,894	5,932	1,284	1,684	1,040	2,679	3,937	6,711	16,818	2,260	1,292	714	73,245
Nov.	43,147	10,518	32,629	4,288	2,273	1,141	455	2,303	3,724	3,818	8,863	2,445	907	876	63,722
Dec.	37,838	7,529	30,309	4,942	3,028	1,233	171	3,079	3,881	5,206	3,854	4,532	1,352	1,122	62,709
1936:															
Jan.	39,101	12,582	26,519	4,178	1,299	2,317	938	1,665	4,315	6,347	9,381	2,449	1,606	839	61,853
Feb.	38,436	18,857	19,579	3,664	1,382	2,107	529	3,663	4,789	6,643	15,851	2,892	1,201	1,051	63,353
Mar.	46,552	12,026	34,526	4,336	1,324	1,848	342	2,966	4,484	5,052	9,225	2,553	1,264	751	68,671
Apr.	36,251	14.702	21,549	3,172	1,230	2,053	869	1,596	4,895	6,446	13,032	2,416	1,056	947	59,261
May	46,568	12,527	34,041	2,560	1,117	2,354	517	2,077	4,258	6,015	10,766	2,281	956	776	67,718
June	40,049	15,026	25,023	3,766	1,226	1,386	461	3,737	4,577	6,519	14,588	2,733	917	823	65,756
July	53,114	19,038	34,076	3,773	1,359	1,399	1,035	3,734	6,133	8,578	17,946	2,738	964	933	82,668
Aug.	43,506	13,361	30,145	3,940	776	2,541	656	3,284	4,978	7,353	12,106	3,017	542	1,054	70,392
Sept.	44,110	10,039	34,071	5,367	664	1,139	537	3,259	4,531	6,241	10,175	3,505	1,119	937	71,545
Oct.	46,543	12,960	33,583	5,599	1,181	2,143	1,086	3,349	6,477	8,145	12,881	3,874	1,255	1,105	80,678
Nov.	47,342	16,923	30,419	4,960	1,322	1,950	701	2,260	5,398	7,109	16,718	3,872	1,592	1,163	77,464
Dec.	38,714	9,758	28,956	4,377	1,844		506	2,988	6,472	10,129	9,536	8,450	1,721	1,087	76,072
1937:															
Jan.	41,571	16,956	24,615	4,541	1,077	4,063	1,234	3,849	5,136	8,011	13,102	2,828	1,271	1,000*	70,727
Feb.	38,058	14,048	24,010	5,619	1,831	2,043	790	3,554	5,484	7,656	12,414	3,074	1,692	1,000*	69,167
Mar.	59.568	19,579	39,989	7,066	2,040	1,425	1,239	3,873	7.791	11,848	19,969	3,173	1,749	1,000*	101,162
Apr.	58,718	17,136	41,582	3,423	1,203	2,960	783	1,899	6,999	8,967	15,989	2,094	1,522	1,000*	88,421
May	51,152	17,350	33,802	4,612	1,012	742	778	2,238	7,530	8,981	21,085	2,887	1,063	1,000*	85,730
June	54,809	23,614	31,195	5,180	1,100	1,890	813	2,933	8,269	12,467	25,225	3,669	1,000*	1,000*	94,741
July	72,704														

(1) Malayan net exports cannot be taken as production, since imported rubber is largely wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 115 tons in 1923, 1,117 in 1924, 3,618 in 1925, 3,263 in 1926, 2,439 in 1927, 1,437 in 1928, 2,670 in 1929, and 1,274 in 1930. (2) Ceylon Chamber of Commerce statistics until 1926; rubber exported as latex is not included—such shipments were equivalent to 18 tons in 1923, 93 tons in 1924, 6 tons in 1925, 20 tons in 1926, about ½ ton in 1927, and 1 ton in 1928, and practically none in 1929, 1930 and 1931. (3) Official statistics. (4) Imports into Singapore and Penang. (5) Exports from "Other D.E.I." are chiefly wet native rubber, which is reduced about one-third in weight by remilling; rubber exported as latex is not included which on a basis of 3½ pounds per gallon amounted to 2,342 tons in 1923, 1,008 tons in 1924, 2,239 tons in 1925, 44 tons in 1926, 84 tons in 1927, 1,459 tons in 1928, 1,302 tons in 1929, and 2,656 tons in 1930. (6) Calculated from official import statistics of principal consuming countries, viz., United States, United Kingdom, France, Germany, Belgium and Netherlands, and includes guayule rubber. (7) This total includes the third column for British Malaya, "Gross Exports minus Imports," and all the figures shown for the other territories. * Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

Net Imports of Crude Rubber into Principal Manufacturing Countries

(*Long Tons*)

	United States [1]	United Kingdom	France (h)	Germany	Canada (ac)	Japan (da)	Italy	Russia (ce)	Australia (cd)	Belgium (d)	Netherlands	Scandinavia (abcdf)	Spain (g)	Czechoslovakia (abcd)	World Total
1919	238,407	42,671	17,685	5,584	6,395	9,753	9,894	75	1,002	3,995	2,771	3,149	2,418	9	343,808
1920	249,530	56,844	13,885	11,890	11,746	5,297	6,123	62	1,815	3,840	5,510	2,292	2,008	567	371.409
1921	179,736	42.087	15,135	21,920	8,124	21,713	3,906	165	1,014	1,705	1,022	1,279	2,245	569	300,620
1922	296,594	11.724	24,352	27,546	9,207	15,934	6,430	2,493	2,643	172	—3,807	1,778	589	567	396.222
1923	301,527	12,700	27,392	18.519	13,277	15,372	8,489	2,986	1,649	2,184	792	2,528	630	1,128	409,173
1924	319,103	—11.550	30,446	22,727	14,299	19,571	8,764	2,346	3,124	2,688	—807	3,178	944	1,370	416,203
1925	385,596	4,061	32,956	33,937	19,683	11.117	11,412	7,088	4.757	2,930	875	3,149	1,155	1.558	520,274
1926	399,981	84,865	34,240	22,773	20,229	18.125	9,809	6,529	9,021	2,498	2,670	4.046	1,299	1.870	617,957
1927	403,472	60,249	34,271	38.892	26,405	20,521	11,381	12,018	9,490	6,482	636	4,224	2,055	2,672	632,768
1928	407,572	4,846	36,498	37,855	30,447	25,621	12,433	15,134	8,430	7,958	2,243	4,418	3,178	3,138	599,771
1929	528,608	122,675	55,093	49,275	35,453	34,284	17,169	11,774	15.886	9,443	3,022	6.440	864	4.650	894.638
1930	458,036	120,069	68,503	45,488	28,793	33.039	18,639	16,387	5,354	10,635	2,924	7,710	2,400	4,468	822,445
1931	475,993	86.170	46,466	39,688	25.261	43,483	10,149	30,671	7,649	11,009	2.220	6.360	2,605	7,717	794,641
1932	393,844	44,086	42,506	45,121	20,917	56.027	14,469	30,637	12.576	9.519	2,851	7,262	4,359	9,444	693.618
1933	398.365	73.335	61,953	54,120	19,332	66.831	19,341	29,830	13,534	11,166	1,243	7,831	5,520	10,402	772,803
1934	439.172	158.482	49.560	59.330	28,439	69,905	21,398	47.271	9,642	9,115	3,758	12,418	6.900	10,999	926.389
1935	455,758	128.829	51,450	62.899	26.870	57.567	21.880	37,572	9,978	7,593	4,068	11,878	8,140	11,245	895,727
1936	475,359	—2,591	57,032	71,794	27,871	61,223	17,000*	30,967	14,109	9,648	2,888	11,236	6,668	8,772	791,976
1936:															
Mar.	33,743	—1,227	4,333	4,569	1,811	5.170	1,000*	4.376	819	1.033	339	754	1,113	410	58,243
April	44,948	2,097	4,250	5,497	1,079	4,929	1,500*	3,251	919	1,097	238	848	679	603	71,935
May	35,549	302	4.335	4.639	2.221	5,531	1.000*	4.220	1,034	698	103	657	500*	667	61,456
June	35,901	—1,493	4,846	5,698	2,042	4,567	1,500*	2,427	1,635	579	—27	650	500*	323	59,148
July	38,556	—766	4,621	6,837	2,274	5,126	2,000*	1,733	1,363	713	183	1,094	500*	495	64,729
Aug.	41,094	—1,581	4,513	6,556	3,781	4,305	1,500*	3.128	807	789	42	1,145	500*	989	67,440
Sept.	49,483	—12	4,393	6,006	2,393	5,195	1,500*	2,922	2,297	514	471	1,090	300*	624	77,176
Oct.	40,301	—87	4,752	7,232	3,110	6,600	1,500*	2,761	1,092	817	343	1,171	200*	1,026	70,818
Nov.	37,897	—742	3,282	6,500	4,308	3,961	1,500*	2,162	964	1,090	445	1,388	200*	823	63,778
Dec.	50,838	—4,926	4,688	7,458	1,193	8,698	1,500*	3,426	1,184	759	276	1,206	200*	1,701	78,201
1937:															
Jan.	42,655	33	4,430	7,041	1,632	8,357	1,700	2,633	582	854	269	1,115	200*	567	72,368
Feb.	44,398	—222	5,296	7,911	1,271	6,630	1,502	3,048	304	1,363	245	452	200*	837	73,233
Mar.	39,888	343	5,347	7,668	2,612	6,935	2,119	3,598	1,293	1,641	371	709	200*	601	72,727
Apr.	42,066	3,808	5,291	8,664	1,343	5,837	1,669	1,532	1,058	1,069	362	1,070	200*	1,445	80,414
May	48,506	6,100	5,558	6,706	4,187	8,596	2,772	1,886	1,290	2,113	361	1,576	200*	925	90,776
June	48,972	5,157		6,469		7,608			2,226		521				

a—Including gutta percha. b—Including balata. c—Re-exports not deducted in monthly statistics. d—Including some scrap and reclaimed rubber. e—Official statistics of rubber imports by Soviet Russia. f—Including Norway, Sweden, Denmark and Finland. g—United Kingdom and French exports to Spain except in years prior to 1925. h—French imports have been reduced 12 per cent in order to eliminate imports of gutta percha and to reduce to basis of net weight. [1] United States imports of guayule are included in this compilation. * Figure is provisional; final figure will be shown when available.

NOTE: ANNUAL FIGURES ARE MORE ACCURATE; THEY ARE REVISED AT THE END OF THE FOLLOWING YEAR.

The WHERE-TO-BUY Section of THE RUBBER AGE in which are listed the Products and Services of the Leading Suppliers to the Industry.

The Market Place

If what you are seeking is not listed here, write to the Service Department of THE RUBBER AGE, 250 West 57th St., New York, N. Y.

Chemicals and Compounding Materials

ACCELERATORS—
El-Sixty, Ureka C, Guantal, Ureka, A-1, A-10, A-19, A-32, A-100, Pipsolene, Pip-Pip, DPG, R-2.
ANTIOXIDANTS — Fleetols B, H, White.
MONSANTO CHEMICAL CO.
Rubber Service Laboratories Div.
1012 Second National Bldg., Akron, Ohio

AERO BRAND RUBBER CHEMICALS
DPG—DOTG—Accelerator 49
Rubber Sulphur
American Cyanamid & Chemical Corporation
30 Rockefeller Plaza, New York, N. Y.

ALUMINUM FLAKE
A uniform, fine, low gravity, white reinforcing pigment. *Furnished to the rubber trade for 25 years.*
The Aluminum Flake Co.
Akron, Ohio

ANTIMONY Pentasulphide. golden and crimson, very fine, pure.
Rare Metal Products Co.
Belleville, N. J.
Direct Factory Representation

ASBESTINE—Specially prepared for use in Rubber. Send for liberal working samples.
SOLE PRODUCERS
International Pulp Co.
41 Park Row New York City

CALCENE—The Ideal low gravity, white reinforcing pigment. Gives high tensile and elongation properties with exceptionally good resistance to tear and abrasion.
The Columbia Alkali Corporation
BARBERTON, OHIO

CARBON BLACK—*Micronex*
the world's standard gas black, universally known as the "King of Rubber Pigments."
Binney & Smith Co.
41 East 42nd St. New York City

RATES
for Listings in this Section

\$5.00 per listing per month.

10% Discount if 2 listings per month are used.

15% Discount for 3 or more listings per month.

Copy Subject to Style Regulations.
No cuts accepted.

CARBON BLACK
CONTINENTAL
The Newest Name in Carbon Black offers
CONTINENTAL DUSTLESS
CONTINENTAL COMPRESSED
CONTINENTAL UNCOMPRESSED
Continental Carbon Company
295 Madison Ave., New York, N.Y.

CARBON BLACK—*Aerfloted*
Arrow Black for rubber compounding. Standard for grit-free uniformity.
J. M. Huber, Inc.
460 West 34th St. New York

CARBON BLACK
SUPREME—*the up-to-date standard for rubber*
Imperial Oil & Gas Products Co.
Grant Building, Pittsburgh, Pa.

CARBON BLACK
DIXIE...KOSMOS
Used throughout the world
UNITED CARBON COMPANY
Charleston, W. Va.
New York • Akron • Chicago

CARBON BLACK
WITCO DISPERSO
and DUSTLESS and a
Complete Line of High Quality
Rubber Chemicals
Wishnick-Tumpeer, Inc.
295 Madison Ave., New York, N.Y.

CATALPO—The universal and standard rubber pigment now being used in treads, solids, tubes, carcass frictions, etc.
Moore & Munger
33 Rector Street, New York City

CHEMICALS
Carbon Black—Clay—Colors
Accelerators—Sulphur
Stocks Carried At All Times
Ernest Jacoby & Co.
79 Milk St. Boston, Mass.
Cable Address: Jacobite Boston

CHEMICALS

For Rubber	For Industry Generally	
Accelerators	*Acids*	*Latex*
Antioxidants	*Oil of Myrbane*	*Lotol*
Specialties	*Aniline Oil*	*Dispersions*

NAUGATUCK CHEMICAL
Div. of U. S. Rubber Products, Inc.
1790 BROADWAY NEW YORK

CHEMICALS and Mineral
Ingredients—Whiting, Clay, Talc, Barytes, Colors. Heavy Calcined Magnesia. Carbonate of Magnesia, Pumice Stone.
Standard Since 1890
Whittaker, Clark & Daniels, Inc.
260 West Broadway New York

COLLOIDAL SULPHUR
COLLOIDAL ZINC OXIDE
COLLOIDAL COLORS
HEVEATEX CORPORATION
78 Goodyear Ave. Melrose, Mass.
Offices in New York, Akron, Chicago

COLORS—*for Rubber*
Fine organic colors—Reds, Blues, Oranges, Violets, Greens—or any shade to meet your requirements—also Rubber Dispersed Colors
Ansbacher-Siegle Corporation
Rosenbank, Staten Island, N. Y.
820 So. Clinton St., Chicago, Ill.
Agents in Principal Cities

COLORS
BRILLIANT ORGANIC DYES; PERMANENT, NON-BLEEDING, LOW COST
For All Cures
MONSANTO CHEMICAL CO.
Rubber Service Laboratories Div.
1012 Second National Building
Akron, Ohio

THE MARKET PLACE Section Continued on Next Page

SIGN OF THE TIMES

Scene in Our Plant, THE PIONEER ASPHALT COMPANY

Everywhere there are signs that point to business on a bigger scale. Producers and distributors are confidently going ahead with plans for expansion. Activity is in the air. Are you equipped with a reliable, cooperative source of supply for chemicals, oils and pigments?

Witco is prepared to meet your requirements with a comprehensive variety of products and experienced technical counsel in all matters pertaining to their use. We invite your investigation of the following:

WITCO CARBON BLACKS are produced to rubber manufacturers' individual requirements. A black for every purpose, each with a proven record of quality results.

WITCO BARYTES easily pass the most critical inspection for high barium sulphate content, fineness of grinding, texture and color quality.

WITCO WHITING is known for its excellent tear resistance, a vitally important property in such articles as inner tubes, bath caps, hot water bottles and rubber sheeting.

WITCO CADMIUM REDS give excellent results in products where bright color, fastness to light, alkalies, and resistance to acids and heat are required. Five grades: Light, Medium Light, Medium, Deep and Maroon.

WITCO

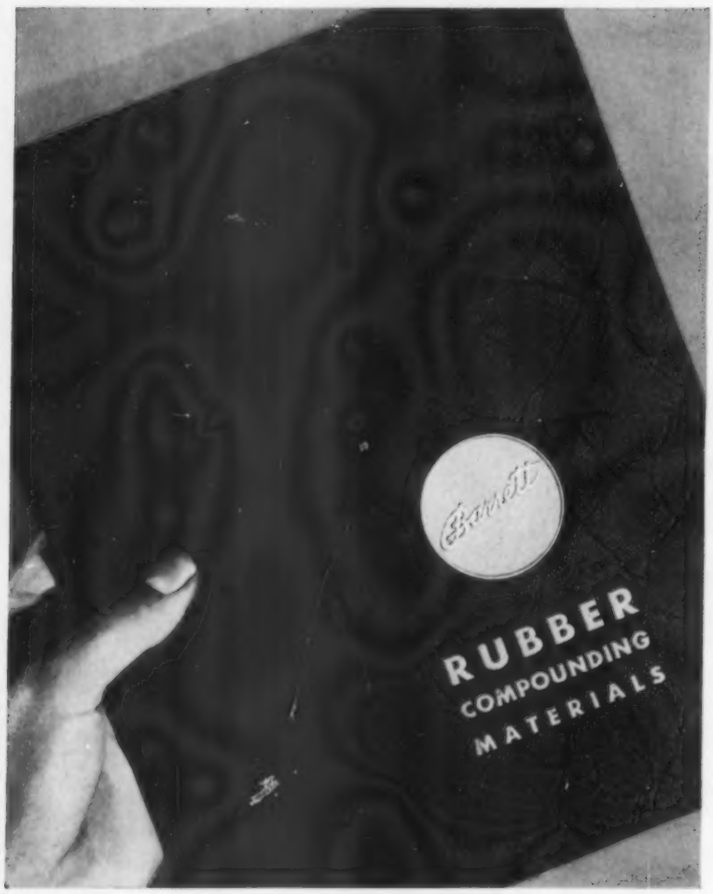
WISHNICK-TUMPEER, INC.

Manufacturers and Importers

NEW YORK . . . 295 MADISON AVENUE
CHICAGO . . . . . TRIBUNE TOWER
BOSTON . . . . . 141 MILK STREET
CLEVELAND . 616 ST. CLAIR AVENUE, N. E.
WITCO LTD., BUSH HOUSE, LONDON W. C. 2, ENGLAND

Witco Affiliates: Witco Oil & Gas Company
The Pioneer Asphalt Company
Panhandle Carbon Company

BUY DIRECT AND PROFIT DIRECTLY



. . . a complete reference manual of BARRETT RUBBER COMPOUNDING MATERIALS.

For years, The Barrett Company has produced reliable solvents, softeners and compounding materials of the coal-tar type to meet special requirements of the rubber industry. In this convenient 16-page booklet, Barrett describes these products, gives specifications and suggests uses. Every rubber manufacturer will wish to have a copy for reference. You may obtain yours without cost, simply by writing on your firm letterhead.

THE BARRETT COMPANY

40 Rector Street, New York, N. Y.

Barrett CHEMICALS

LATEX

NORMAL-CONCENTRATED-PROCESSED

LATEX In The Form Most Suitable For Your Requirements

UNIFORM STANDARIZED RELIABLE

Ample Stocks Always On Hand For Immediate Delivery

Trade Mark

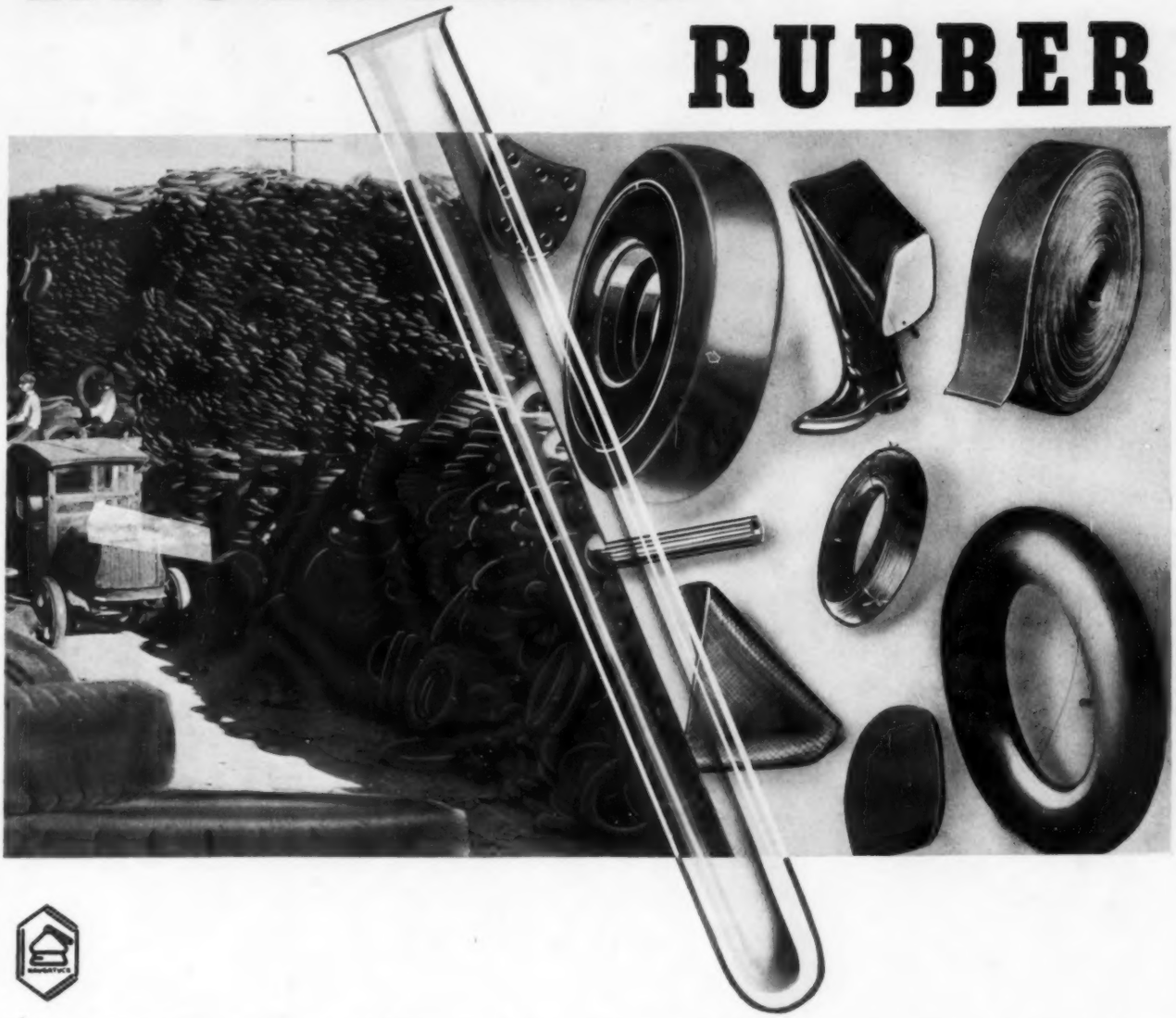
HEVEATEX CORPORATION

78 GOODYEAR AVE. MELROSE, MASS.

Trade Mark

NEW YORK, N. Y. CHICAGO, ILL. AKRON, OHIO.

RECLAIMED RUBBER



RECLAIMED RUBBER made by the alkali and acid processes—produced with modern equipment—checked for quality, uniformity, and processing ability by experienced and thoroughly reliable laboratory technicians is made by one of the oldest and most reliable rubber reclaimers.

Naugatuck Reclaims are designed for specific use—but special Reclaims are made for particular applications. All Naugatuck Reclaims are noted for their uniformity and processing quality. Technical data and assistance are provided.

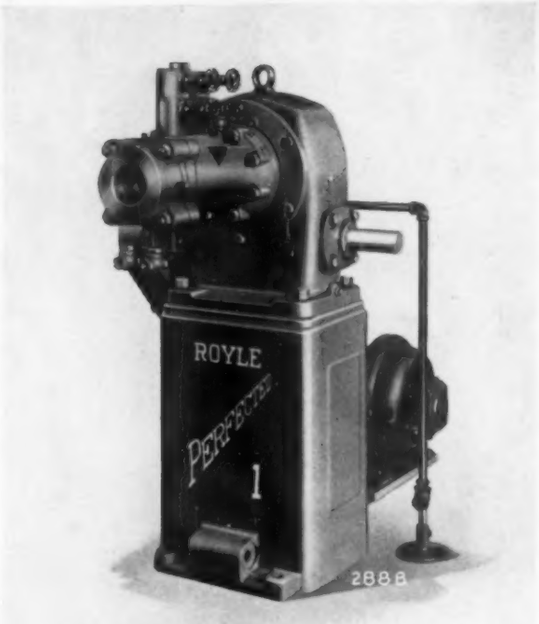
Naugatuck Chemical

DIVISION OF UNITED STATES RUBBER PRODUCTS, INC.

1790 BROADWAY **NEW YORK, N. Y.**

NEWS...

Every rubber manufacturer needs this convenient size extruder for work in the class of druggists' and stationers' sundries, weather strip, pen barrels, bead wire coating, electric wire insulation, etc. The new Perfected No. 1 is completely redesigned. Positive temperature control. Automatic lubrication. Smooth, vibrationless V-belt drive. Quiet, efficient worm-and-gear reduction. Roller bearings. Royle standards throughout. Investigate today.



Illustrated: The No. 1 machine with tubing head.

J.C.CLINEFELTER
AKRON, OHIO
JEFFERSON 9638

JOHN ROYLE & SONS

SELSON MACHINE
TOOL COMPANY Ltd.
LONDON, ENG.

SHERWOOD 2-8262 PATERSON - NEW JERSEY CABLE ROYLE PATERSON

THE RUBBER AGE

(of London)

THE MONTHLY PUBLICATION

for

ALL BRANCHES OF THE RUBBER INDUSTRY

Circulates Among Raw Rubber Producers,
Importers, Manufacturers
and Dealers

Published on
1st of each month

Subscription 10/- per annum
Single copies 1/3d post free

OFFICES:—43 ESSEX STREET, STRAND, LONDON, W.C.2

Single Pigment BROWNS

...another way to say MAPICO BROWNS

MAPICO Browns produce by themselves with a minimum of pigmentation, rich brown rubber obtainable otherwise only by mixing two or more pigments. Because they are pure iron oxides they do not fade. They are resistant to acids, alkalis and other color-destroying agents. Fine uniform particle size and easy dispersion are notable qualities of MAPICO Browns. They are chemically stable and inert, and do not react with other materials employed in rubber compounding. Ever increasing use of MAPICO Browns in the production of rubber footwear and mechanical goods testifies to the quality-making ability of these unique, modern pigments. • Our Research Department will gladly consult with manufacturers and their chemists on technical problems.

MAPICO Browns

PURE OXIDES OF IRON

MAPICO

• Yellow and Red shades of Mapico pure Iron Oxides are also available.

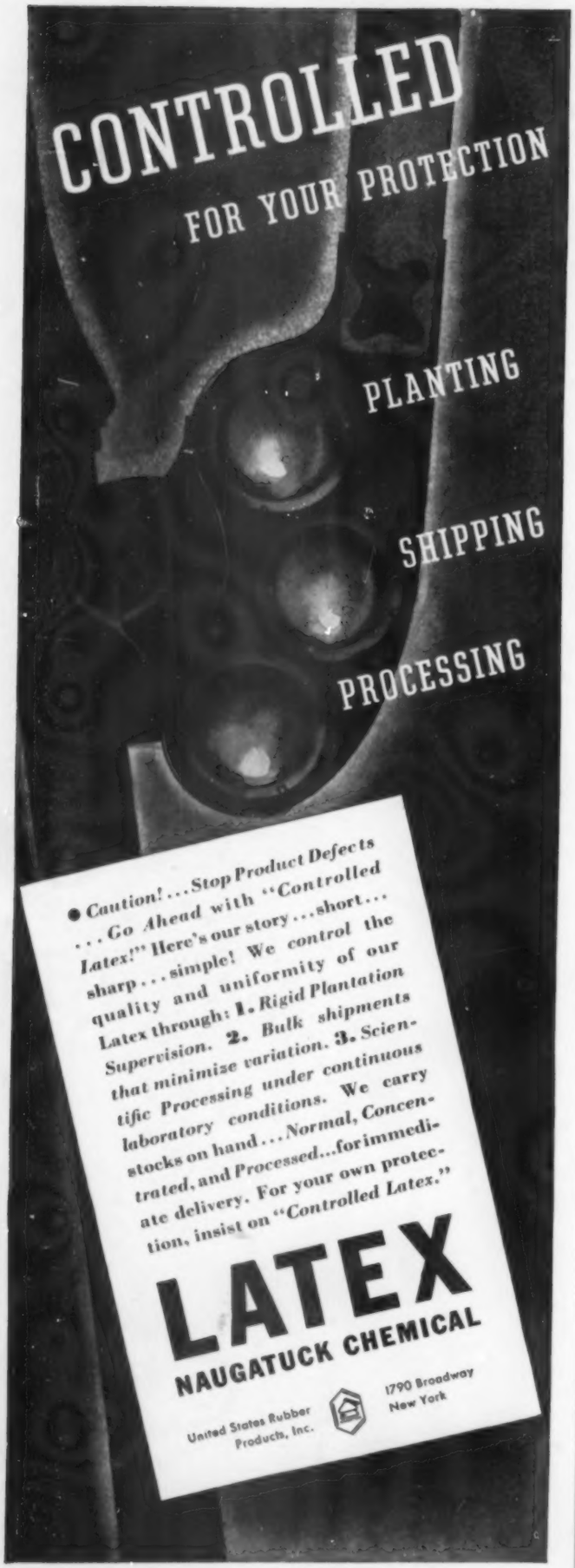
MAGNETIC PIGMENT CO.

DIVISION OF COLUMBIAN CARBON COMPANY

BINNEY & SMITH CO.

Distributors

41 East 42nd Street New York City


CONTROLLED
FOR YOUR PROTECTION
PLANTING
SHIPPING
PROCESSING
● Caution!...Stop Product Defects ...Go Ahead with "Controlled Latex!" Here's our story...short... sharp...simple! We control the quality and uniformity of our Latex through: 1. Rigid Plantation Supervision. 2. Bulk shipments that minimize variation. 3. Scientific Processing under continuous laboratory conditions. We carry stocks on hand...Normal, Concentrated, and Processed...for immediate delivery. For your own protection, insist on "Controlled Latex."
LATEX
NAUGATUCK CHEMICAL
United States Rubber Products, Inc.
1790 Broadway New York

PEQUANOC STANDARDS

RECLAIMED RUBBER

▼ ▼ ▼

....UNIFORMITY SERVICE.....

PEQUANOC RUBBER COMPANY
BUTLER, N. J.

ROBERT KNOBLOCK,
Mid-western Representative
2301 Lincoln Way West
Mishawaka, Indiana

HAROLD P. FULLER,
New England Representative
31 St. James Ave.
Boston, Mass.

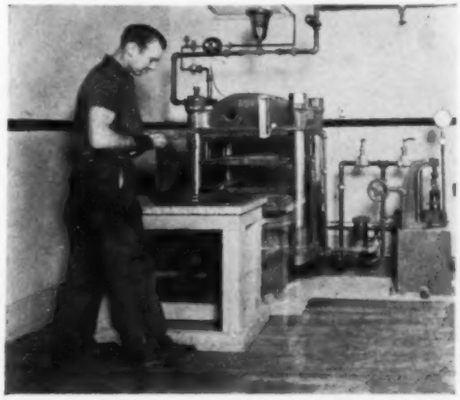
E. B. ROSS,
Canadian Representative
No. 1 Toronto Street,
Toronto, Ontario, Canada

HECHT, LEVIS & KAHN, Ltd.
European Representative
17 St. Dunstan's Hill, E.C. 3
London, England

READY ACCEPTANCE

•

Continental Carbon Company's first few months' production of carbon black has been tested extensively...approved...and is now being used in increasing quantities by some of the country's most discriminating companies. Here is the ready acceptance that a fine product deserves to receive. Continental assures you the same high quality and uniformity in meeting your requirements for carbon black and offers you experienced cooperation in all matters pertaining to its use.



CONTINENTAL CARBON COMPANY

295 MADISON AVENUE, NEW YORK, N. Y.

One of the industry's indispensable reference books

"RUBBER—Physical and Chemical Properties"

By T. R. DAWSON—Head of Information Bureau, Research Ass'n of British Rubber Manufacturers

and B. D. PORRITT—Director, Research Ass'n of British Rubber Manufacturers

Published by
The Research Association of British Rubber Manufacturers

This voluminous book brings together for the first time detailed information on the physical and chemical properties of rubber. It contains data from over 1400 papers, pamphlets and books, and is indispensable to rubber manufacturers as well as to the user and purchaser of rubber goods.

The book should be in the library of every rubber research worker, chemist, physicist and engineer. Not only does it record detailed results of the effect and action of hundreds of compounding ingredients but in addition contains tables bearing on all the special phenomena related to vulcanization, on ageing, and on the variability of crude rubber. It also contains a mass of information of value to the user of latex. In addition, a section is devoted to methods of analysis and testing and to specifications.

700 pages — 9 x 11 inches — completely indexed.

PRICE: $12.50 Postpaid

Available from Book Department of

THE RUBBER AGE

250 West 57th Street New York

A copy of this book should be in the technical library of every rubber factory.

Linde 66
Linde 86

UNION CARBIDE COMPANY

KOSMOS-DIXIE

COMPRESSED CARBON GAS BLACKS

UNITED CARBON COMPANY

CHARLESTON
WEST VIRGINIA

Orders Being Accepted Now for

Second Edition of

MARCHIONNA'S

"LATEX & RUBBER DERIVATIVES AND THEIR INDUSTRIAL APPLICATIONS"

Bibliography covering Patents and Published Literature from June, 1932 to January, 1937.

1600 Pages—In 2 Volumes (Volumes II and III)

Available in October

●

PRICE—Vol. II and III—$20 *(Not Sold Separately)*

Vol. I, *("Latex and Its Industrial Applications")*—$15

Combination Price—Vols. I, II and III—$30

●

BOOK DEPARTMENT

THE RUBBER AGE

250 West 57th St. New York

HEAT RESISTANT CORD
—THE ANSWER
TO INTERNAL TIRE HEAT

Tires operating under present day conditions generate high temperatures, which tend to hasten deterioration and disintegration.

HEAT RESISTANT CORD retards this deterioration to a marked degree, giving less tire growth and longer tire life.

All cotton fiber consists of a group of cells composed of cellulose particles believed to be of crystalline structure bonded together by a pectin substance. When cords made from cotton are subjected to the high temperatures developed in present day tire operation, the pectin substance deteriorates and disintegration sets in.

It can be compared to a brick building where the mortar crumbles and disappears, so that with nothing to hold the bricks together, the building collapses.

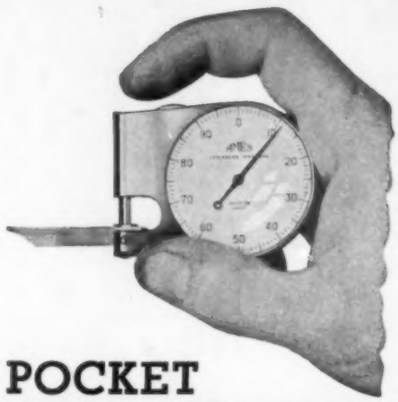
In our HEAT RESISTANT CORD, we have developed a process which preserves the "mortar" and holds the "bricks" together under the highest temperatures that will be encountered in tire operation.

HEAT RESISTANT CORD is the long sought answer to the hardest problem confronting tire engineers—internal heat.

For further details write

BIBB MANUFACTURING CO.
MACON, GEORGIA

AKRON	NEW YORK	CHICAGO
707 United Bldg.	74 Leonard St.	1074 Merchandise Mart



VEST POCKET THICKNESS MEASURE

The Ames Rubber Thickness Gauge fits in your vest pocket—but its simple, positive mechanism is accurate to within five ten-thousandths of an inch!

Fractions and decimal equivalents are stamped on the back of the case in clear figures. Unbreakable crystal. Stainless steel case—rustless.

Send your check or money order for $9.50 (price includes leather container) to the B. C. Ames Co., Waltham, Mass.

RANDALL & STICKNEY

Hand Grip Rubber Gauge No. 3-B

Height .....9"	Length .....9¼"	Range .....½"
Depth of Throat ....6½"	Dial 50 Divisions Each Div. 1/1000"	Weight .... 4 lbs. Frame . Aluminum

Designed for gauging stock as it is coming from the calender.

FRANK E. RANDALL, Waltham, Mass.

Manufacturers of

Rubber Plant EQUIPMENT

We make equipment of practically every type for all requirements of small and large factories

Specialists in Latex Equipment

PROMPT QUOTATIONS

Continental Machinery Company

277 Broadway, New York, N. Y.

Telephone:	Cable Address:
WOrth 2-1650-1651	"Contimac," New York

Our Motto—"Through Service We Live and As We Live We Grow."

WHY AIRTIGHT VALVE CAPS ARE NECESSARY!

Under average service conditions, dirt—enough to cause leakage—can enter a tire valve through even the slightest opening.

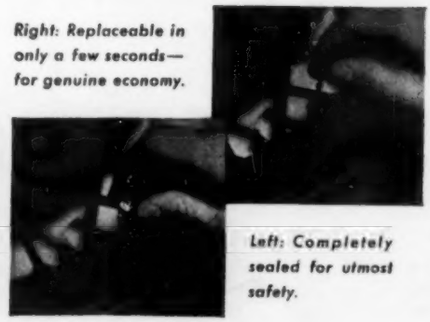
Airtight valve caps seal the valve mechanism within the housing and completely exclude dust and dirt. Even a damaged valve mechanism is relatively unimportant if the housing is sealed by a Schrader Valve Cap! The cap will carry on until the valve mechanism can conveniently be replaced.

Replaceability and world-wide distribution make safe, doubly-sealed Schrader-type Tire Valves the most practical and economical.

Guaranteed airtight up to 250 lbs. pressure.

Dirt and dust cannot enter doubly-sealed Schrader Tire Valves.

COMPLETE PROTECTION



Right: Replaceable in only a few seconds—for genuine economy.

Left: Completely sealed for utmost safety.

A. Schrader's Son Brooklyn, New York
Division of Scovill Manufacturing Company, Inc.

Schrader
REG. U. S. PAT. OFF.
Makers of Pneumatic Valves Since 1844

SCRAP RUBBER
CRUDE RUBBER
HARD RUBBER DUST

A. SCHULMAN Inc.
AKRON, OHIO 1006 AKRON SAVINGS AND LOAN BUILDING
BOSTON, MASS. 636 STATLER BLDG.
E. ST. LOUIS, ILL. 1401 MISSISSIPPI AVE.

DON'T PLAY WITH DYNAMITE!

In other words don't take chances you can easily avoid. Use LATEX and there will be . . .

NO EXPLOSION

Result: a downright saving of insurance premium dollars because of reduced hazards.

SAVE MONEY

. . . on solvents (all that evaporates is water) . . . on heavy milling machinery . . . on labor . . . on power . . . and . .

GAIN

. . . safety of operation . . . employee ease of mind . . . better aging . . . greater tensile strength . . . better quality . . . at less cost.

Revertex Compounding Paste 225
Use: Single-sided rubberizing

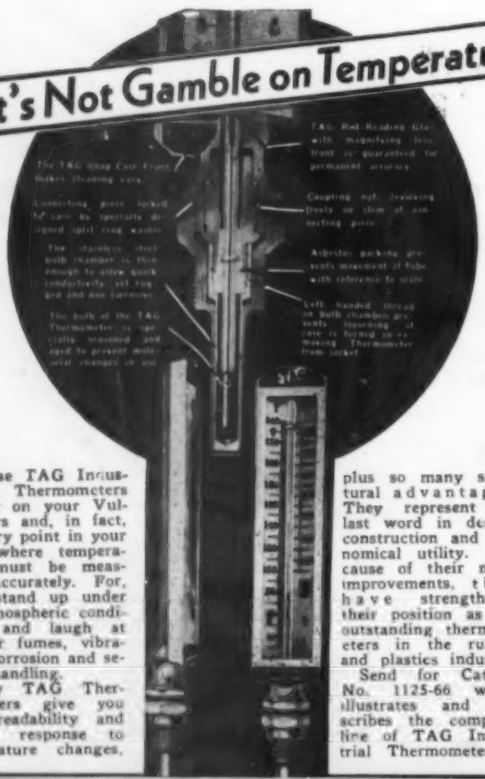
DESCRIPTION: When mixed with Revertex makes a spread which after drying over steam coils becomes absolutely non-tacky and water-repellent. Contains an ultra-accelerator which eliminates the sulfur chloride cure and the starchbox.

RECOMMENDED for non-fraying coatings and inexpensive waterproof linings. Available in neutral and black. Other colors made up to order.

REVERTEX CORPORATION OF AMERICA

80 BROAD STREET R X NEW YORK, N. Y.

Let's Not Gamble on Temperature



These TAG Industrial Thermometers belong on your Vulcanizers and, in fact, at every point in your cure where temperature must be measured accurately. For, they stand up under all atmospheric conditions and laugh at sulphur fumes, vibration, corrosion and severe handling.

Only TAG Thermometers give you easy readability and precise response to temperature changes, plus so many structural advantages. They represent the last word in design, construction and economical utility. Because of their many improvements, they have strengthened their position as the outstanding thermometers in the rubber and plastics industry.

Send for Catalog No. 1125-66 which illustrates and describes the complete line of TAG Industrial Thermometers.

C. J. TAGLIABUE MFG. CO.
Park & Nostrand Ave's., Brooklyn, N. Y.

COLORS
FOR RUBBER

Permanent Brilliant Yellow

STRONGER—CLEANER
FASTER-TO-LIGHT

In Powder - Rubber Dispersed - Paste

•

Our rubber laboratory is equipped to assist with your color problems

Ansbacher-Siegle
CORPORATION
Manufacturers of Fine Chemical Pigment Colors
General Offices, Works, and Laboratories
ROSEBANK, STATEN ISLAND, NEW YORK, N. Y.
Boston, Chicago, Los Angeles, Cleveland, Detroit, San Francisco, Richmond, Toronto, Can.

It's TINTING STRENGTH that gives Titanox Pigments their "Edge"

When maximum whiteness or brilliance of tint is desired with minimum loading, use Titanox pigments. Tremendous tinting strength is one of their outstanding characteristics.

That is so because Titanox pigments have the highest indices of refraction among white pigments produced commercially. They are whitest of the whites, extremely fine and disperse easily. They are not affected by accelerators or sulphur.

Minimum loading with Titanox pigments spells economy—lower pigment cost. Also it results in a better product—more elastic and more durable.

You may use these super-pigments with every assurance that their performance will be in keeping with their promise.

●

TITANOX-A (Titanium Dioxide) and **TITANOX-C** (Titanium Calcium Pigment) are recommended for compounding white and light-tinted rubber. Our Service Department will gladly demonstrate their respective uses.

For Whiteness, Brightness or Clear, Brilliant Tints use Titanox Pigments in:

CAPS...SUITS...TOYS...TUBING
FOOTWEAR . . . . GOLF BALLS
DRUG SUNDRIES...CONVEYOR
BELTS..TIRE SIDEWALLS..HOSPITAL SHEETING...RUBBERIZED
FABRICS...AND MANY OTHER
SIMILAR PRODUCTS.

TITANIUM PIGMENT CORPORATION

Sole Sales Agent

111 Broadway, New York, N. Y.; Carondelet Station, St. Louis, Missouri; National Lead Company (Pacific Coast Branch), 2240 24th St., San Francisco, California

TITANOX

TITANOX

TRADE MARK

NUBA

A Low-Cost Thermal-Softening Plastic

- This new dark resinous pitch has toughness and elasticity, binding strength, minimum tendency to "cold flow", and is not extremely brittle at low temperatures. Available in large tonnage at 80-95°C, 100-125°C and 135-150°C melting point ranges.

Suggested Uses—

Rubber, and Mastic Floor Tile Compounding; Binding, Filling and Sealing Materials; Adhesives; Insulating and Waterproofing Compounds; Low-Priced Molding Compounds and Protective Coatings.

Working Samples at Your Request

THE NEVILLE COMPANY
PITTSBURGH, PA.
12-R

Invitation to *SLUMBER* in NEW YORK

DIRECTIONS for sound sleep: snuggle between the snowy white sheets of any bed in the McAlpin . . . relax upon a deep, soft mattress . . . let its luxury soothe your body into refreshing slumber.

Your COMPLETE comfort was our first consideration when planning the equipment of the beautiful NEW rooms at Hotel McAlpin.

JOHN J. WOELFLE, *Manager*

ROOMS WITH BATH FROM

$2.50 Single $4.00 Double $4.50 Twin-Bedded

Hotel McAlpin

The Centre of Convenience

BROADWAY AT 34th STREET, NEW YORK

INTERNATIONAL PULP CO., *41 Park Row, New York, N.Y.*

SOLE PRODUCERS OF PURE **ASBESTINE** SPECIALLY PREPARED FOR USE IN RUBBER

Covered and Protected by Letters Patent Registered at U. S. Patent Office, Washington, D. C.

LIBERAL WORKING SAMPLE FURNISHED FREE

MECHANICAL MOLDED RUBBER GOODS

We Solicit Your Inquiries

THE BARR RUBBER PRODUCTS COMPANY
SANDUSKY, OHIO

12 Issues a Year

$2.00 Annual Subscription

THE RUBBER AGE

NEOPHAX — Vulcanized Vegetable Oils FOR NEOPRENE

"Neoprene can be loaded with FACTICE and fillers to a greater extent than rubber and yet retain its rubber-like properties to a remarkable degree. Such stocks tube smoothly and rapidly, calender nicely at low heats and, when vulcanized, give snappy, rubbery stocks."

Reg. U.S. Pat. Off.

THE STAMFORD RUBBER SUPPLY CO. STAMFORD CONN.

Makers of FACTICE Since 1900

Reg. U.S. Pat. Off.

The Long Awaited A.C.S. Monograph No. 74

CHEMISTRY and TECHNOLOGY of RUBBER

Edited by C. C. Davis and John T. Blake

REMARKABLY comprehensive in its scope, this official publication of the A.C.S. Rubber Division at last provides an authoritative reference book on both the theoretical and practical aspects of rubber technology. The fact that each chapter has been contributed by an expert or group of collaborators, especially eminent in their own particular fields, gives the book an authority, and a compelling interest, obtainable in no other way. For each special subject great care has been exercised to furnish adequate historical perspective for the most significant presentation of recent developments. Other attractive features are extensive bibliographies conveniently placed at the end of each chapter, and an unusually complete index, particularly emphasizing cross-references. A final chapter devoted to concise discussion of the literature of rubber chemistry also increases the utilitarian character of this volume.

IN view of the notable advances in rubber manufacture during the past two decades, the appearance of this monograph is especially timely. Emphasis is placed on the latest technical developments in the manufacturing industry, which have grown out of such research achievements as the x-ray study of a configuration of the rubber molecule; a more complete understanding of the behavior of rubber in liquids; and the growing realization of the basic changes in physical structure developed during reinforcement loading and vulcanization.

THE special value of this book lies in the fact that the exposition of these recondite theoretical studies is well balanced by the comprehensive discussion of up-to-date manufacturing practice. The exhaustive treatment of the mechanism of the aging, oxidation, and deterioration of rubber on exposure to light and heat, for example, is supplemented by a complete list of commercial anti-oxidants and age-resisters, and by a detailed description of the beneficial effect of other compounding ingredients in this respect. The fundamental, mathematical physics of vulcanized rubber, is offset by a chapter on current standard test methods and physical testing equipment. Fundamental theorizing as to the mechanism of acceleration, or the nature of vulcanization, is balanced by practical comments on compounding materials, and by a complete compilation of routine analytical methods for crude rubber and for commercial vulcanized rubber products. Specialized subjects such as rubber reclaiming; balata and gutta percha; synthetic rubber and rubber substitutes receive adequate treatment.

The result is that the book has a universal appeal, to the research investigator and student, as well as to the routine analyst; to the development engineer, and to the factory compounder. It is both a practical manual and an authoritative reference work. It belongs in all technical libraries, in plant laboratories, and in factory offices.

TABLE OF CONTENTS

Chap.

I. Composition of Crude Rubber—*A. Van Rossem*

II. Physical Properties of Raw Rubber—*G. Stafford Whitby*

III. Chemistry and Structure of Rubber Hydrocarbon—*Harry L. Fisher and Roscoe H. Gerke*

IV. Mastication and Plasticity—*Wilfred Gallay*

V. Structure and Behavior of Rubber in Liquids—*Warren F. Busse*

VI. Theories and Phenomena of Vulcanization—*Ira Williams*

VII. Vulcanization without Sulfur—*Iwan I. Ostromislensky*

VIII. Accelerators. Their History and Use—*Sidney M. Cadwell and J. W. Temple*

IX. Theories of Acceleration—*Winfred Scott and L. B. Sebrell*

X. The Physics of Vulcanized Rubber—*W. W. Vogt*

XI. Fillers and Reinforcing Agents—*Norman A. Shepard, John N. Street and Charles R. Park*

XII. History and Use of Substances which Improve Aging—*Waldo L. Semon*

XIII. Autooxidation and Deterioration by Oxygen. Prooxygens and Antioxygens—*Charles Dufraisse*

XIV. Deterioration of Rubber by Heat, Light and Ozone—*F. Harris Cotton*

XV. The Electrical Behavior of Rubber—*Archibald T. McPherson*

XVI. Properties of Latex—*W. A. Gibbons and P. D. Brass*

XVII. Industrial Uses of Latex—*D. F. Twiss, E. W. Madge and G. W. Trobridge*

XVIII. Hard Rubber (Ebonite)—*A. R. Kemp and F. S. Malm*

XIX. Rubber Derivatives of Commercial Utility—*T. R. Dawson and P. Schidrowitz*

XX. Synthetic and Substitute Rubbers—*Thomas Midgley, Jr.*

XXI. Gutta Percha and Balata—*J. N. Dean*

XXII. Reclaimed Rubber—*George W. Miller*

XXIII. Practical Compounding—*W. F. Russell*

XXIV. Physical Testing and Specifications—*Arthur W. Carpenter*

XXV. Chemical Analysis of Rubber and Rubber Products—*R. P. Dinsmore, R. H. Seeds and H. E. Rutledge*

XXVI. Literature on the Chemistry of Rubber—*C. C. Davis*

Now Available

896 pages—Illustrated—PRICE: $15.00

BOOK DEPARTMENT

THE RUBBER AGE

250 West 57th St., N. Y. City

Materials for Rubber Compounding

SMITHKO PRODUCTS

CLAY	WAXES
MICA	WHITING
TALC	MAGNESIA
BARYTES	GREEN OXIDE
RED OXIDE	CARBON BLACK

SMITH CHEMICAL & COLOR CO.
55 John St. Brooklyn, N. Y.

MANDRELS
STOCK SHELLS
HOSE POLES
Air Bag BUFFERS

Send us your inquiries.

For 27 years we have been supplying dependable Calender Stock Shells and Mandrels of all types to leading rubber plants throughout the world.

We can furnish a type for every need. We also make Hose Poles, Air Bag and Side Wall Buffing Machines and Mandrel Polishers.

The National Sherardizing & Machine Co.
868 Windsor St. Hartford, Conn.
Representatives in Akron, California and New York

THE HIGHEST ATTAINMENT
in Cutting Dies

FREMONT dies are made of scientifically tempered imported steel and STAY SHARP. Uniform height, correct outside bevel and inside slope or clearance assure even cutting pressure, prevent clogging and elimi-nate spoil-age, repairs and delay. Depend on Fremont engineering service. Send patterns or blue prints. Sales repre-sentatives for Rawhide Mallets

CHARACTER IN CUTTING DIES

Fremont Tool & Die Co.
432-438 N. Wood St.
Fremont, O.

WHITTAKER
ESTABLISHED 1890

Standard for 47 years

MAGNESIA

Whittaker, Clark & Daniels, Inc.
IMPORTERS—MANUFACTURERS—EXPORTERS
260 WEST BROADWAY NEW YORK CITY

1880 *Rand* 1937
RUBBER GOODS
"They Last Longer"

DRESS SHIELDS	BABY BIBS
DRESS SHIELD LININGS	HOUSEHOLD APRONS
BABY PANTS	SANITARY BELTS
CRIB SHEETS	APRONS—BLOOMERS
BATHING CAPS	SKIRTS—STEPINS
RUBBERIZED SHEETING	CHILDREN'S APRONS

SHEETED RUBBER—PLAIN & RANDPRINT—For Manufacturers
RAIN CAPES and COATS
RAND RUBBER CO., Brooklyn, N. Y.

GUIGNET'S GREEN
(Chromium Hydroxide)

The brightest of the permanent green pigments

Write for samples

C. K. Williams & Co. Easton, Pa.
Geo. S. Mepham & Co. East St. Louis, Ill.

The CARTER BELL MFG CO

CARTER BELL 1903 RUBBER SUBSTITUTES

150 Nassau Street New York

RMP
ANTIMONY
FOR RED RUBBER
ATTRACTIVE ... NON-DETERIORATING
RARE METAL PRODUCTS CO.
BELLEVILLE, N. J.